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AND

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Mr. Hobbes, of Malmesbury, thought the accumulation of details a hindrance of learning, and used to wish that all the books in the world were embarked in one ship and that he might be permitted to bore a whole in its bottom. He was right in one sense; for the disquisitions and treatises with which our libraries are filled are often merely the husks and shells of knowledge; but it would be to be wished that, before he were permitted to bore his hole, some literary analysts should select all the Facts, Recipes, and Prescriptions useful to man, and condense them into a Portable Volume. LOCKE.

BY COLIN MACKENZIE,

Author of One Thousand Experiments in Manufactures and Chemistry.

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PREFACE.

As the object of all study, and the end of all wisdom, is practical utility, so a collection of the most approved Receipts, in all the arts of Domestic and Social Life, may be considered as a volume containing nearly the whole of the wisdom of man worthy of preservation. In truth, the present volume has been compiled under the feeling, that if all other books of science in the world were destroyed, this single volume would be found to embody the results of the useful experience, observations, and discoveries of mankind during the past ages of the world.

Theoretical reasonings and historical details have, of course, been avoided, and the object of the compiler has been to economize his space, and come at once to the point. Whatever men do, or desire to do, with the materials with which nature has supplied them, and with the powers which they possess, is here plainly taught and succinctly preserved: whether it regard complicated manufactures, means of curing diseases, simple processes of various kinds, or the economy, happiness, and preservation of life.

The best authorities have been resorted to, and innumerable volumes consulted, and wherever different processes of apparently equal value, for attaining the same end, have been found, they have been introduced.

A general, rather than a scientific, arrangement has been adopted, because the object of the work is popular and universal, and, though likely to be useful to men of science, it is more especially addressed to the public at large. In like manner, as far as possible, technical and scientific language has been avoided, and popular names and simple descriptions have been preferred.

THE

UNIVERSAL RECEIPT BOOK,

OR

PRACTICAL LIBRARY.

METALLURGY.

ASSAYING OF METALLIC ORES.

BEFORE metallic ores are worked upon in the large way, it will be necessary to inquire what sort of metal, and what portion of it, is to be found in a determinate quantity of the ore; to discover whether it will be worth while to extract it largely, and in what manner the process is to be conducted, so as to answer that purpose. The knowledge requisite for this is called the art of assaying.

Assay of ores in the dry way.

The assaying of ores may be performed either in the dry or moist way; the first is the most ancient, and, in many respects, the most advantageous, and consequently still continues to be mostly used.

Assays are made either in crucibles with the blast of the bellows, or in tests under a muffle.

Assay weights.

The assay weights are always imaginary, sometimes an ounce represents a hundred weight on the large scale, and is subdivided into the same number of parts, as that hundred weight is in the great; so that the contents of the ore obtained by the assay shall accurately determine by such relative proportion the quantity to be expected from any weight of the ore on a larger scale.

Roasting the ore.

In the lotting of the ores, care should be taken to have small portions from different specimens, which should be pulverized, and well mixed in an iron or brass mortar. The proper quantity of the ore is now taken, and if it contain either sulphur or arsenic, it is put into a crucible or test, and exposed to a moderate degree of heat, till no vapour arises from it; to assist this volatilization, some add a small quantity of powdered charcoal.

Fluxes.

To assist the fusion of the ores, and to convert the extraneous matters connected with them into scoria, assayers use different kinds of fluxes. The most useful and efficacious materials for the composition of these are, borax, tartar, nitre, sal ammoniac, common salt, glass, fluor-spar, charcoal powder, pitch, lime, litharge, &c. in different proportions.

Crude or white flux.

This consists of 1 part of nitre, and 2 of tartar, well mixed together.

Black flux.

The above crude flux detonates by means of kindled charcoal, and if the detonation be effected in a mortar slightly covered, the smoke that rises unites with the alkalized nitre and the tartar, and renders it black.

Cornish reducing flux.

Mix well together 10 ounces of tartar, 3 ounces and 6 drachms of nitre, and 3 ounces and 1 drachm of borax.

Cornish refining flux.

Deflagrate, and afterwards pulverize, 2 parts of nitre, and 1 part of tartar.

The above fluxes answer the purpose very well, provided the ores be deprived of all their sulphur; or, if they contain much earthy matters, because, in the latter case, they unite with them, and convert them into a thin glass; but if any quantity of sulphur remain, these fluxes unite with it, and form a liver of sulphur, which has the power of destroying a portion of all the metals; consequently, the assay under such circumstances must be very inaccurate. The principal difficulty in assaying appears to be in the appropriation of the proper fluxes to each particular ore, and it likewise appears, that such a discriminating knowledge can only be acquired from an extensive practice, or from a knowledge of the chemical affinities and actions of different bodies upon each other.

In assaying, we are at liberty to use the most expensive materials to effect our purpose, hence the use of different saline fluxes; but in the working at large, such expensive means cannot be applied; as by such processes the inferior metals would be too much enhanced in value, especially in working very poor ores. In consequence of which, in smelting works, where the object is the production of metals in the great way, cheaper additions are used; such as lime-stone, feldt-spar, fluor-spar, quartz, sand, slate, and slags. These are to be chosen according to the different views of the operator, and the nature of the ores. Thus iron ores, on account of the argillaceous earth they contain, require calcareous additions, and the copper ores, rather slags or vitresent stones, than calcareous earth.

Humid assay of metallic ores.

The mode of assaying ores for their particular metals by the dry way, is deficieut so far as relates to pointing out the different substances connected with them, because they are always destroyed by the process for obtaining the assay metal. The assay by the moist way is more correct, because the different substances can be accurately ascertained. The late celebrated Bergman first communicated this method. It depends upon a knowledge of the chemical affinities of different bodies for each other; and must be varied according to the nature of the ore; it is very extensive in its application, and requires great patience and address in its execution. To describe the treatment of each variety of metallic ores would take up too much of our room; but to give a general idea, we shall describe the procedure, both in the dry and the humid way, on one species of all the different ores.

To assay iron ores.

The ore must be roasted till the vapour ceases to arise. Take 2 assay quintals of it, and triturate them with one of fluor-spar, 3-4 of a quintal of powdered charcoal, and 4 quintals of decrepitated sea salt; this mixture is to be put into a crucible, lined on the inside with clay and powdered charcoal; a cover must be luted upon the crucible, and the crucible itself exposed to a violent fire for an hour, and and when it is cool, broken. When, if the operation has been well conducted, the iron will be found at the bottom of the crucible; to which must be added those metalic particles, which may adhere to the scoria. The metallic particles so adhering may be separated, by pulverizing it in paper, and then attracting them with a magnet.

Another mode.

If the ore should be in a calciform state, mixed with earths, the roasting of it previous to assaying, if not detrimental, is at least superfluous; if the earths should be of the argillaceous and siliceous kind, to half a quintal of them, add of dry quick lime and fluor-spar of each 1 quintal and 1-4, reduced to powder, and mix them with 1-4 of a quintal of powdered charcoal, covering the whole with one ounce of decrepitated common salt; and expose the luted crucible to a strong forge fire for an hour and a quarter, then let it gradually cool, and let the regulus be struck off and weighed.

Another.

If the ore contain calcareous earth, there will be no occasion to add quick lime; the proportion of the ingredients may be as follows: viz. 1 assay quintal of the ore; 1 of decrepitated sea-salt; 1-2 of powdered charcoal; and 1 of fluor-spar, and the process conducted as above.

There is a great difference in the reguli of iron; when the cold regulus is struck with a hammer and breaks, the iron is called cold short: if it break on being struck red-hot, it is called red short: but if it resist the hammer, both in its cold and ignited state, it is good iron.

Humid assay of iron ore.

To assay the calciform ores, which do not contain much earthy or stony matter, they must be reduced to a fine powder, and dissolved in the marine acid, and precipitated by the Prussian alkali. A determinate quantity of the Prussian alkali must be tried previously, to ascertain the portion of iron which it will precipitate, and the estimate made accordingly. If the iron contains any considerable portion of zinc or manganese, the precepitate must be calcined to redness, and the calx treated with dephlogisticated nitrous acid, which will then take up only the calx of zinc; when this is separated, the calx should again be treated either with nitrous acid, with the addition of sugar, or with the acetous acid, which will dissolve the manganese, if any; the remaining calx of iron may then be dissolved by the marine acid, and precipitated by the mineral alkali; or it may be farther calcined, and then weighed.

Zinc ores.

Take the assay weight of roasted ore, and mix it well with 1-8th part of charcoal dust, put it into a strong luted earthen retort, to which must be fitted a receiver; place the retort in a furnace, and raise the fire, and continue it in a violent heat for two hours, suffer it then to cool gradually and the zinc will be found adhering to the neck of the retort in its metallic form.

In the humid way.

Distil vitriolic acid over calamine to dryness; the residuum must be lixiviated in hot water; what remains undissolved is silecious earth; to the solution add caustic volatile alkali, which precipitates the iron and argil, but keeps the zinc in solution. The precipitate must be redissolved in vitriolic acid, and the iron and argil separated.

Tin ores.

Mix a quintal of tin ore, previously washed, pulverized, and roasted, till no arsenical vapour arises, with half a quintal of calcined borax, and the same quantity of pulverized pitch: these are to be put in a crucible moistened with charcoal-dust and water, and the crucible placed in an air-furnace. After the pitch is burnt, give a violent heat for a 1-4 of an hour, and on withdrawing the crucible, the the regulus will be found at the bottom. If the ore be not well washed from earthy matters, a large quantity of borax will be requisite, with some powdered glass; and if the ore contain iron, some alkaline salt may be added.

In the humid way.

The assay of tin ores in the liquid way was looked upon as impracticable, till Bergman devised the following method, which is generally successful. Let the tin ore be well separated from its stony matrix, by well washing, and then reduced to the most subtle powder; digest it in concentrated oil of vitriol, in a strong heat for several hours, then, when cooled, add a small portion of concentrated marine acid, and suffer it to stand for an hour or two; then add water, and when the solution is clear, pour it off, and precipitate it by fixed alkali—131 grains of this precipitate, well washed and dried, are equivalent to 100 of tin in its reguline state, if the precipitate consist of pure tin; but if it contain copper or iron, it must be calcined in a red heat for an hour, and then digested in nitrous acid, which will take up the copper; and afterwards in marine acid, which will separate the iron.

Lead ores.

As most of the lead ores contain either sulphur or arsenic, they require to be well roasted. Take a quintal of roasted ore, with the same quantity of calcined borax, 1-2 a quintal of fine powdered glass, a 1-4th of a quintal of pitch, and as much clean iron filings. Line the crucible with wetted charcoal dust, and put the mixture into the crucible, and place it before the bellows of a forge-fire. When it is red hot, raise the fire for 15 or 20 minutes, then withdraw the crucible, and break it when cold.

In the humid way.

Dissolve the ore by boiling it in dilute nitrous acid: the sulphur, insoluble stony parts, and calx of iron will remain. The iron may be separated by digestion in the marine acid, and the sulphur by digestion in caustic fixed alkali. The nitrous solution contains the lead and silver, which should be precipitated by the mineral fixed alkali, and the precipitate well washed in cold water, dried, and weighed. Digest it in caustic volatile alkali, which will take up the calx of silver; the residuum being again dried and weighed, gives the proportion of the calx of lead, 132 grains of which are equal to 100 of lead in its metallic state. The difference of weight of the precipitate before and after the application of the volatile alkali, gives the quantity of silver, 129 grains of which are equal to 100 of silver in its metallic state.

Copper ores.

Take an exact troy ounce of the ore, previously pulverized, and calcine it well; stir it all the time with an iron rod, without removing it from the crucible; after the calcination add an equal quantity of borax, half the quantity of fusible glass, one-fourth the quantity of pitch, and a little charcoal dust; rub the inner surface of the crucible with a paste composed of charcoal-dust, a little fine powdered clay, and water. Cover the mass with common salt, and put a lid upon the crucible, which is to be placed in a furnace: the fire is to be raised gradually, till it burns briskly, and the crucible continued in it for half an hour, stirring the metal frequently with an iron rod, and when the scoria which adheres to the rod appears clear, then the crucible must be taken out, and suffered to cool; after which it must be broken, and the regulus separated and weighed: this is called black copper, to refine which, equal parts of common salt and nitre are to be well mixed together. The black copper is brought into fusion, and a teaspoonful of the flux is thrown upon it, which is repeated three or four times, when the metal is poured into an ingot mould, and the button is found to be fine copper.

In the humid way.

Make a solution of vitreous copper ore, in 5 times its weight of concentrated vitriolic acid, and boil it to dryness; add as much water as will dissolve the vitriol thus formed; to this solution add a clean bar of iron which will precipitate the whole of the copper in its metalic form. If the solution be contaminated with iron, the copper must be redissolved in the same manner, and precipitated again. The sulphur may be separated by filtration.

Bismuth ores.

If the ore be mineralized by sulphur, or sulphur and iron, a previous roasting will be necessary. The strong ores require no roasting, but only to be reduced to a fine powder. Take the assay weight and mix it with half the quantity of calcined borax, and the same of pounded glass; line the crucible with charcoal; melt it as quickly as possible; and when well done, take out the crucible, and let it cool gradually. The regulus will be found at the bottom.

In the humid way.

Bismuth is easily soluble in nitrous acid or aqua regia. Its solution is colourless, and is precipitable by the addition of pure water; 118 grains of the precipitate from nitrous acid, well washed and dried, are equal to 100 of bismuth in its metallic form.

Antimonial ores.

Take a common crucible, bore a number of small holes in the bottom, and place it in another crucible a size smaller, luting them well together; then put the proper quantity of ore in small lumps into the upper crucible, and lute thereon a cover; place these vessels on a hearth, and surround them with stones about six inches distant from them; the intermediate space must be filled with ashes, so that the undermost crucible may be covered with them; but upon the upper, charcoal must be laid, and the whole made red hot by the assistance of hand bellows. The antimony being of easy fusion is separated, and runs through the holes of the upper vessel into the inferior one, where it is collected.

Humid assay of arseniated antimony.

Dissolve the ore in aqua regia, both the regulus and arsenic remain in the solution, the sulphur is separated by filtration. If the solution be boiled with twice its weight of strong nitrous acid, the regulus of antimony will be precipitated, and the arsenic converted into an acid, which may be obtained by evaporation to dryness.

Manganese ores.

The regulus is obtained by mixing the calx or ore of manganese with pitch, making it into a ball, and putting it into a crucible, lined with powdered charcoal, 1-10th of an inch on the sides, and 1-4th of an inch at the bottom, then filling the empty space with charcoal dust, covering the crucible with another inverted and luted on, and exposing it to the strongest heat of a forge for an hour or more.

In the humid way.

The ores should be first well roasted to dephlogisticate the calx of manganese and iron, if any, and then treated with nitrous acid to dissolve the earths. The residuum should now be treated with nitrous acid and sugar, by which means a colourless solution of manganese will be obtained, and likewise of the iron, if any. Precipitate with the Prussian alkali, and digest the precipitate in pure water; the prussiate of manganese will be dissolved, whilst the prussiate of iron will remain undissolved.

Arsenical ores.

This assay is made by sublimation in close vessels. Beat the ore into small pieces, and put them into a matrass, which place in a sand pot, with a proper degree of heat: the arsenic sublimes in this operation, and adheres to the upper part of the vessel; when it must be carefully collected with a view to ascertain its weight. Sometimes a single sublimation will not be sufficient, for the arsenic in many cases will melt with the ore, and prevent its total volatilization; in which case, it is better to perform the first sublimation with a moderate heat, and afterwards bruise the remainder again, and expose it to a stronger heat.

In the humid way.

Digest the ore in marine acid, adding the nitrous by degrees to help the solution. The sulphur will be found on the filter; the arsenic will remain in the solution, and may be precipitated in its metallic form by zinc, adding spirit of wine to the solution.

Nickel ore.

The ores must be well roasted to expel the sulphur and arsenic; the greener the calx proves during this torrefaction, the more it abounds in the nickel; but the redder it is, the more iron it contains. The proper quantity of this roasted ore is fused in an open crucible, with twice or thrice its weight of black flux, and the whole covered with common salt. By exposing the crucible to the strongest heat of a forge fire, and making the fusion complete, a regulus will be produced. This regulus is not pure, but contains a portion of arsenic, cobalt, and iron. Of the first it may be deprived by a fresh calcination, with the addition of powdered charcoal; and of the second by scorification; but it is with difficulty that it is entirely freed from the iron.

In the humid way.

By solution in nitrous acid, it is freed from its sulphur; and by adding water to the solution, bismuth, if any, may be precipitated; as may silver, if contained in it, by the marine acid; and copper, when any, by iron.

To separate cobalt from nickel, when the cobalt is in considerable quantity, drop a saturated solution of the roasted ore in nitrous acid into liquid volatile alkali; the cobaltic part is instantly re-dissolved, and assumes a garnet colour; when filtered, a grey powder remains on the filter, which is the nickel. The cobalt may be precipitated from the volatile alkali by any acid.

Cobalt ores.

Free them as much as possible from earthy matters by well washing, and from sulphur and arsenic by roasting. The ore thus prepared is to be mixed with three parts of black flux, and a little decrepitated sea-salt; put the mixture in a lined crucible, cover it, and place it in a forge fire, or in a hot furnace, for this ore is very difficult of fusion.

When well fused, a metallic regulus will be found at the bottom, covered with a scoria of a deep blue colour: as almost all cobalt ores contain bismuth, this is reduced by the same operation as the regulus of cobalt; but as they are incapable of chemically uniting together, they are always found distinct from each other in the crucible. The regulus of bismuth having a greater specific gravity, is always at the bottom, and may be separated by a blow with a hammer.

In the humid way.

Make a solution of the ore in nitrous acid, or aqua regia, and evaporate to dryness; the residuum, treated with the acetous acid, will yield to it the cobaltic part; the arsenic should be first precipitated by the addition of water.

Mercurial ores.

The calciform ores of mercury are easily reduced without any addition. A quintal of the ore is put into a retort, and a receiver luted on containing some water; the retort is placed in a sand bath, and a sufficient degree of heat given it, to force over the mercury which is condensed in the water of the receiver.

Sulphuretted mercurial ores.

The sulphureous ores are assayed by distillation in the manner above, only these ores require an equal weight of clean iron filings to be mixed with them, to disengage the sulphur, while the heat volatilizes the mercury, and forces it into the receiver. These ores should likewise be tried for cinnabar, to know whether it will answer the purpose of extracting it from them; for this a determinate quantity of the ore is finely powdered and put into a glass vessel, which is exposed to a gentle heat at first, and gradually increased till nothing more is sublimed. By the quantity thus acquired, a judgment may be formed whether the process will answer. Sometimes this cinnabar is not of so lively a colour as that which is used in trade; in this case it may be refined by a second sublimation, and if it be still of too dark a colour, it may be brightened by the addition of a quantity of mercury, and subliming it again.

Humid assay of cinnabar.

The stony matrix should be dissolved in nitrous acid, and the cinnabar being disengaged, should be boiled in 8 or 10 times its weight of aqua regia, composed of 3 parts nitrous, and 1 of marine acid. The mercury may be precipitated in its running form by zinc.

Silver ores.

Take the assay quantity of the ore finely powdered, and roast it well in a proper degree of heat, frequently stirring it with an iron rod; then add to it about double the quantity of granulated lead, put it in a covered crucible, and place it in a furnace; raise the fire gently at first, and continue to increase it gradually, till the metal begins to work; if it should appear too thick, make it thinner by the addition of a little more lead; if the metal should boil too rapidly, the fire should be diminished. The surface will be covered by degrees with a mass of scoria, at which time the metal should be carefully stirred with an iron hook heated, especially towards the border, lest any of the ore should remain undissolved; and if what is adherent to the hook when raised from the crucible melts quickly again, and the extremity of the hook after it is grown cold is covered with a thin, shining, smooth crust, the scorification is perfect; but, on the contrary, if while stirring it, any considerable clamminess is perceived in the scoria, and when it adheres to the hook, though red hot, and appears unequally tinged, and seems dusty or rough, with grains interspersed here and there, the scorification is incomplete; in consequence of which the fire should be increased a little, and what adheres to the hook should be gently beaten off, and returned with a small ladle into the crucible again. When the scorification is perfect, the metal should be poured into a cone, previously rubbed with a little tallow, and when it becomes cold, the scoria may be separated by a few strokes of a hammer. The button is the produce of the assay.

By cupellation.

Take the assay quantity of ore, roast and grind it with an equal portion of litharge, divide it into 2 or 3 parts, and wrap each up in a small piece of paper; put a cupel previously seasoned under a muffle, with about six times the quantity of lead upon it. When the lead begins to work, carefully put one of the papers upon it, and after this is absorbed, put on a second, and so on till the whole quantity is introduced; then raise the fire, and as the scoria is formed, it will be taken up by the cupel, and at last the silver will remain alone. This will be the produce of the assay, unless the lead contains a small portion of silver, which may be discovered by putting an equal quantity of the same lead on another cupel, and working it off at the same time; if any silver be produced it must be deducted from the assay. This is called the witness.

In the humid way.

Boil vitreous silver ore in dilute nitrous acid, using about 25 times its weight, until the sulphur is quite exhausted. The silver may be precipitated from the solution by marine acid, or common salt; 100 grains of this precipitate contain 75 of real silver; if it contain any gold it will remain undissolved. Fixed alkalies precipitate the earthy matters, and the Prussian alkali will show if any other metal be contained in the solution.

To assay the value of silver.

The general method of examining the purity of silver is by mixing it with a quantity of lead proportionate to the supposed portion of alloy; by testing this mixture, and afterwards weighing the remaining button of silver. This is the same process as refining silver by cupellation.

It is supposed that the mass of silver to be examined consists of 12 equal parts, called penny-weights; so that if an ingot weighs an ounce, each of the parts will be 1-12th of an ounce. Hence, if the mass of silver be pure, it is called silver of 12 pennyweights; if it contain 1-12th of its weight of alloy, it is called silver of 11 penny-weights; if 2-12ths of its weight be alloy, it is called silver of 10 penny-weights; which parts of pure silver are called 5 penny-weights. It must be observed here, that assayers give the name penny-weight to a weight equal to 24 real grains, which must not be confounded with their ideal weights. The assayers' grains are called fine grains. An ingot of fine silver, or silver of 12 penny-weights, contains then, 288 fine grains; if this ingot contain 1-288th of alloy, it is said to be silver of 11 penny-weights and 23 grains; if it contain 4-288ths of alloy, it is said to be 11 penny-weights, 20 grains, &c. Now a certain real weight must be taken to represent the assay weights: for instance, 36 real grains represent 12 fine penny-weights; this is subdivided into a sufficient number of other smaller weights, which also represent fractions of fine penny-weights and grains. Thus, 18 real grains represent 6 fine penny-weights; 3 real grains represent 1 fine penny-weight, or 24 grains; a real grain and a half represents 12 fine grains; 1-32d of a real grain represents a quarter of a fine grain, which is only 1-752d part of a mass of 12 penny-weights.

Double assay of silver.

It is customary to make a double assay. The silver for the assay should be taken from opposite sides of the ingot, and tried on a touch stone. Assayers know pretty nearly the value of silver merely by the look of the ingot, and still better by the test of the touch stone. The quantity of lead to be added is regulated by the portion of alloy, which being in general copper, will be nearly as follows:

Of silver

	dwt.	gr.		dwt.	gr.	Requires from times its weight of lead.
From	11	6	to	—	—	5 to 6
	0	12	to	—	—	8 to 9
	19	18	to	9	0	12 to 13
	8	0	to	7	12	13 to 14
	6	18	to	6	0	14 to 15
	3	0	to	1	12	0 to 16
	1	12	to	0	18	0 to 20

The cupel must be heated red hot for half an hour before any metal is put upon it, by which all moisture is expelled. When the cupel is almost white by heat, the lead is put into it, and the fire increased till the lead becomes red hot, smoking, and agitated by a motion of all its parts, called its circulation. Then the silver is to be put on the cupel, and the fire continued till the silver has entered the lead; and when the mass circulates well, the heat must be diminished by closing more or less the door of the assay furnace. The heat should be so regulated, that the metal on its surface may appear convex and ardent, while the cupel is less red; that the smoke shall rise to the roof of the muffle; that undulations shall be made in all directions; and that the middle of the metal shall appear smooth with a small circle of litharge, which is continually imbibed by the cupel. By this treatment the lead and alloy will be entirely absorbed by the cupel, and the silver become bright and shining, when it is said to lighten; after which, if the operation has been well performed, the silver will be covered with rainbow colours, which quickly undulate and cross each other, and then the button becomes fixed and solid.

The diminution of weight shows the quantity of alloy. As all lead contains a small portion of silver, an equal weight with that used in the assay is tested off, and the product deducted from the assay weight. This portion is called THE WITNESS.—*Richardson's Metallic Arts.*

Ores and earths containing gold.

That which is now most generally used is by amalgamation, the proper quantity is taken and reduced to a powder; about one-tenth of its weight of pure quicksilver is added, and the whole triturated in an iron mortar. The attraction subsisting between the gold and quicksilver, quickly unites them in the form of an amalgam, which is pressed through shamoy leather; the gold is easily separated from this amalgam, by exposure to a proper degree of heat, which evaporates the quicksilver, and leaves the gold. This evaporation should be made with luted vessels.

This is the foundation of all the operations by which gold is obtained from the rich mines of Peru, in Spanish America.

Another method.

Take a quantity of the gold sand and heat it red hot, quench it in water; repeat this two or three times, and the colour of the sand will become a reddish brown. Then mix it with twice its weight of litharge, and revive the litharge into lead, by adding a small portion of charcoal-dust, and exposing it to a proper degree of heat; when the lead revives, it separates the gold from the sand; and the freeing of the gold from the lead must be afterwards performed by cupellation.

Another.

Bergman assayed metallic ores containing gold, by mixing two parts of the ore well pounded and washed, with 1 and a 1-2 of litharge, and three of glass; covering the whole with common salt, and melting it in a smith's forge, in a covered crucible; he then opened the crucible, put a nail into it, and continued to do so till the iron was no longer attacked. The lead was thus precipitated which contained the gold, and was afterwards separated by cupellation.

Humid assay of gold mixed with martial pyrites.

Dissolve the ore in 12 times its weight of dilute nitrous acid, gradually added; place it in a proper degree of heat; this takes up the soluble parts, and leaves the gold untouched, with the insoluble matrix, from which it may be separated by aqua regia. The gold may be again separated from the aqua regia by pouring ether upon it; the ether takes up the gold, and by being burnt off leaves it in its metallic state. The solution may contain iron, copper, manganese, calcareous earth, or argil; if it be evaporated to dryness, and the residuum heated to redness for half an hour, volatile alkali will extract the copper; dephlogisticated nitrous acid, the earths; the acetous acid, the manganese; and the marine acid, the calx of iron. The sulphur floats on the first solution, from which it should be separated by filtration.

ALLOYS OR COMPOUND METALS.

Metals, in general, will unite with each other by fusion or amalgamation, and acquire new properties. Brass is a compound of copper and zinc; and possesses a different colour to either of the component parts.

The attraction of cohesion of the different metals which are to form the compound must be overcome; accordingly, they become intimately mixed together. The compound is not formed by a chemical union of the particles of the different metals, but from an equable diffusion throughout each other, in mass. As metals fuse in different degrees of heat, care should be taken not to add those metals which fuse easily, to others which require a greater degree of heat, while they are too hot; because the former may evaporate and leave the compound imperfect. Or, if they are brought into fusion together, it should be under a flux to prevent the volatile metals from evaporating, before the union is effected.

Queen's metal.

Melt together 4 1-2 lb. of tin, 1-2 lb. of bismuth, 1-2 lb. of antimony, and 1-2 lb. of lead. A very excellent alloy will be formed by using these proportions; it is used for making teapots and other vessels which are required to imitate silver. They retain their brilliancy to the last.

Another.

A very fine silver-looking metal is composed of 100 pounds of tin, 8 of regulus of antimony, 1 of bismuth, and 4 of copper.

Tombac.

Melt together 16 pounds of copper, 1 pound of tin, and 1 pound of zinc.

Red tombac.

Put into a crucible 5 1-2 pounds of copper: when fused, add 1-2 pound of zinc: these metals will combine, forming an alloy of a reddish colour, but possessing more lustre than copper, and also greater durability.

White tombac.

When copper is combined with arsenic, by melting them together in a close crucible, and covering the surface with muriate of soda, to prevent oxidation, a white brittle alloy is formed.

Common pewter.

Melt in a crucible 7 pounds of tin, and when fused throw in 1 pound of lead, 6 ounces of copper, and 2 ounces of zinc. This combination of metals will form an alloy of great durability and tenacity; also of considerable lustre.

Best pewter.

The best sort of pewter consists of 100 parts of tin, and 17 of regulus of antimony.

Hard pewter.

Melt together 12 pounds of tin, 1 pound of regulus of antimony, and 4 ounces of copper.

Flute-key valves.

Fuse in a crucible 4 ounces of lead and 2 ounces of antimony, and cast into a bar. This alloy is of considerable hardness and lustre, and is used by flute manufactures, (when turned into small buttons in a lathe,) for making valves to stop the key-holes of flutes.

Common solder.

Put into a crucible 2 pounds of lead, and when melted, throw in 1 pound of tin. This alloy is that generally known by the name of solder. When heated by a hot iron, and applied to tinned iron with powdered rosin, it acts as a cement or solder; it is also used to join leaden pipes, &c.

Hard solder.

Melt together 2 pounds of copper, and 1 pound of tin.

Soft solder.

Melt together 2 pounds of tin, and 1 of lead.

Printers' types.

Put into a crucible 10 pounds of lead and when it is in a state of fusion, throw in 2 pounds of antimony; these metals in such proportions form the alloy of which common printing types are made. The antimony gives a hardness to the lead, without which the type would speedily be rendered useless in a printing press. Different proportions of lead, copper, brass, and antimony, frequently constitute this metal. Every artist has his own proportions, so that the same composition cannot be obtained from different foundries; each boasts of the superiority of his own mixture.

Small types and stereotype plates.

Melt 9 pounds of lead, and throw into the crucible 2 pounds of antimony, and 1 pound of bismuth: these metals will combine, forming an alloy of a peculiar quality. This quality is *expansion* as it cools; it is therefore well suited for the formation of small printing types (particularly when many are cast together to form stereotype plates,) as the whole of the mould is accurately filled with the alloy; consequently there can be no blemish in the letters. If a metal or alloy liable to *contract* in cooling were to be used, the effect of course would be very different.

Another.

The proprietors of different foundries adopt different compositions for stereotype plates. Some form an alloy of 8 parts of lead, 2 parts of antimony, and 1-8th part of tin.

Mode of casting.

For the manufacture of stereotype plates, plaister of Paris, of the consistence of a batter-pudding before baking, is poured over the letter-press page, and worked into the interstices of the types with a brush. It is then collected from the sides by a slip of iron or wood, so as to lie smooth and compact. In about two minutes, the whole mass is hardened into a solid cake. This cake, which is to serve as the matrix of the stereotype plate, is now put upon a rack in an oven, where it undergoes great heat, so as to drive off superfluous moisture.. When ready for use, these moulds, according to their size, are placed in in flat cast-iron pots, and are covered over by another piece of cast-iron perforated at each end, to admit the metallic composition intended for the preparation of the stereotype plates. The flat cast-iron pots are now fastened in a crane, which carries them steadily to the metallic-bath, or melting-pot, where they are immersed and kept for a considerable time, until all the pores and crevices of the mould are completely and accurately filled. When this has taken place, the pots are elevated from the bath by working the crane, and are placed over a water trough, to cool gradually. When cold, the whole is turned out of the pots, and the plaster being separated, by hammering and washing, the plates are ready for use; having received the most exact and perfect impression.

Metallic casts from engravings on copper.

A most important discovery has lately been made, which promises to be of considerable utility in the fine arts: some very beautiful specimens of metallic plates, of a peculiar composition, have lately appeared under the name of "CAST ENGRAVINGS." This invention consists in taking moulds from every kind of engraving, whether line, mezzotinto, or aquatinta, and in pouring on this mould an alloy in a state of fusion, capable of taking the finest impression. The obvious utility of this invention, as applicable to engravings which meet with a ready sale, and of which great numbers are required, will be incalculable; as it will wholly prevent the expense of retouching, which forms so prominent a charge in all works of an extended sale. No sooner is one cast worn out, than another may immediately be procured from the original plate, so that every impression will be a proof. Thus the works of our most celebrated artists may he handed down, *ad infinitum*, for the improvement and delight of future ages, and will afford at the same time the greatest satisfaction to every lover of the fine arts.

White metal.

Melt together 10 ounces of lead, 6 ounces of bismuth, and 4 drachms of regulus of antimony.

Another.

Melt together 2 pounds of regulus of antimony, 8 ounces of brass, and 10 ounces of tin.

Common hard white metal.

Melt together 1 pound of brass, 1 ounce of spelter, and 1-2 an ounce of tin.

Tutenag.

Melt together 2 parts of tin, and 1 of bismuth.

Fusible alloy.

Put into a crucible 4 ounces of bismuth, and when in a state of fusion, throw in 2 1-2 ounces of lead, and, 1 1-2 ounce of tin; these metals will combine, forming an alloy fusible at the temperature of boiling water; the discovery of which is ascribed to Sir Isaac Newton. Mould this alloy in bars, and take them to a silversmith's to be made into half a dozen tea-spoons. If one of these be given to a stranger to stir his tea, as soon as it is poured from the tea-pot, he will be not a little surprised to find the spoon melt in the tea-cup.

The fusibility of this alloy is certainly surprising, for the fusing temperature of each of its components, singly, is higher than twice that of boiling water. Bismuth fuses at 476°, lead at 612°, and tin at 442°; whilst water boils at 212°.

Another.

Melt together 1 ounce of zinc, 1 ounce of bismuth, and 1 ounce of lead; this alloy will be found to be remarkably fusible (although each of the metals, separately, requires considerable heat to melt it,) and will melt even in hot water: It will likewise remain in a fused state on a sheet of a paper, over the flame of a lamp or candle.

Metallographical application of fusible alloys.

Paste a piece of white paper at the bottom of a china saucer, and let it dry: then write on it with common writing ink, and sprinkle some finely-powdered gum arabic over the writing, which will produce a slight relief. When well dried, brush off the powder that does not adhere, and pour fusible metal into the saucer, taking care to cool it rapidly, that crystallization may not take place. In this way a counterpart of the writing will be obtained, impressed on the metal. By immersing the cast in slightly warm water, any adhering gum may be removed, and then, if examined by a glass, the writing may easily be read and seen to be perfect. Afterwards, by using common printer's ink, impressions may be taken from it, all of which will be true *fac-similies* of the first writing.

The difficulties in this new application of the fusible alloy are, to avoid unequal thickness in the plate of metal, which causes it to alter in form, and break under pressure; and to prevent the surface from crystallizing, when the ink will adhere where it is not required.

Casts from fusible metal.

A combination of three parts of lead, with 2 of tin and 5 of bismuth, forms an alloy which melts at the temperature of 197° F.

In making casts with this and similar alloys, it is important to use the metal at a temperature as low as possible; as, if but a few degrees elevated, the water which adheres to the things from which casts are to be taken, forms vapour, and produces bubbles. The fused metal must be allowed to cool in a tea-cup until just ready to set at the edges, and then pour it into the moulds, procuring in this way beautiful casts from moulds of wood, or of other similar substances. When taking impressions from gems, seals, &c. the fused alloy should be placed on paper or paste-board, and stirred about till it becomes pasty, from cooling, at which moment the gem, die, or seal, should be suddenly stamped on it, and a very sharp impression will then be obtained. *Journal of Science*, No. 26.

Metallic injection.

Melt together equal parts of bismuth, lead, and tin, with a sufficient quantity of quicksilver.

This composition, with the addition of a small proportion of mercury, is used for injecting the vessels of many anatomical preparations; also for taking correct casts of various cavities of the body, as those of the ear. The animal structure may be corroded and separated by means of a solution of potass in water; and the metallic cast will be preserved in an isolated state.

For cushions of electrical machinery.

Melt together in a crucible 2 drachms of zinc and 1 of tin; when fused, pour them into a cold crucible, containing 5 drachms of mercury. The mercury will combine with those metals, and form an alloy, (or amalgam, as it is called,) fit to be rubbed on the cushions which press the plate, or cylinder of an electrical machine. Before the amalgam is applied, it is proper to rub the cushion with a mixture of tallow and bees-wax.

For varnishing figures.

Fuse 1-2 an onnce of tin, with the same quantity of bismuth, in a crucible: when melted, add 1-2 an ounce of mercury. When perfectly combined, take the mixture from the fire, and cool it. This substance mixed with the white of an egg, forms a very beautiful varnish for plaster figures, &c.

To plate looking-glasses.

This art is erroneously termed *silvering*, for, as will be presently seen, there is not a particle of silver present in the whole composition.

On tin-foil, fitly disposed on a flat table, mercury is to be poured, and gently rubbed with a hare's foot: it soon unites itself with the tin, which then becomes very splendid, or, as the workmen say, is *quickened.* A plate of glass is then cautiously to be slid upon the tin-leaf, in such a manner as to sweep off the redundant mercury, which is not incorporated with the tin; leaden weights are then to be placed on the glass, and in a little time the quicksilvered tin-foil adheres so firmly to the glass, that the weights may be removed without any danger of its falling off. The glass thus coated is a common looking-glass. About 2 ounces of mercury are sufficient for covering three square feet of glass.

The success of this operation depends much on the clearness of the glass; and the least dirt or dust on its surface will prevent the adhesion of the amalgam or alloy.

Liquid foil for silvering glass globes.

Melt together 1 ounce of clean lead, and 1 ounce of fine tin, in a clean iron ladle; then immediately add 1 ounce of bismuth. Skim off the dross, remove the ladle from the fire, and before it sets, add 10 ounces of quicksilver. Now stir the whole carefully together, taking care not to breathe over it, as the fumes of the mercury are very pernicious. Pour this through an earthen pipe into the glass globe, which turn repeatedly round.

Another.

To 4 ounces of quicksilver, add as much tin-foil as will become barely fluid when mixed. Let the globe be clean and warm, and inject the quicksilver by means of a pipe at the aperture, turning it about till it is silvered all over. Let the remainder run out and hang the globe up.

Another.

For this purpose, 1 part of mercury and 4 of tin have been used; but if 2 parts of mercury, 1 of tin, 1 of lead, and 1 of bismuth, are melted together, the compound which they form will answer the purpose better: either of them must be made in an iron ladle, over a clear fire, and must be frequently stirred.

Bath metal.

Melt together 1 pound of brass, and 4 1-2 ounces of spelter.

Brass.

Put 4 1-2 lbs. of copper into a crucible, expose it to heat in a furnace, and when perfectly fused, add 1 1-2 pounds of zinc. The metals will combine, forming that generally used alloy called brass.

Another.

For brass which is to be cast into plates, from which pans and kettles are to be made, and wire is to be drawn, braziers use calamine of the finest sort, instead of pure zinc, and in a greater proportion than when common brass is made; generally 56 lb. of calamine to 34 lb. of copper. Old brass, which has been frequently exposed to the action of fire, when mixed with the copper and calamine, renders the brass far more ductile, and fitter for the making of fine wire, than it would be without it; but the German brass, particularly that of Nuremberg, is, when drawn into wire, said to be preferable to any made in England, for the strings of musical instruments.

Pinchbeck.

Put into a crucible 5 ounces of pure copper; when it is in a state of fusion add 1 ounce of zinc. The metals combine, forming an alloy not unlike jeweller's gold: pour into a mould of any shape. This alloy is used for inferior jewellery.

Some use only half this quantity of zinc, in which proportion the alloy is more easily worked, especially in the making of jewellery.

Another.

Melt together 1 ounce of brass with 1 1-2 or 2 ounces of copper, fused under a coat of charcoal dust.

Prince's metal.

Melt together 3 ounces of copper, and 1 ounce of zinc: or 8 ounces of brass, and 1 ounce of zinc.

Another.

Melt in a crucible 4 ounces of copper, and when fused, add 2 ounces of zinc; they will combine and form a very beautiful and useful alloy, called Prince Rupert's metal.

Bronze.

Melt in a clean crucible 7 lbs. of pure copper: when fused, throw into it 3 lbs. of zinc, and 2 lbs. of tin. These metals will combine, forming bronze, which, from the exactness of the impression which it takes from the mould, has in ancient and modern times, been generally used in the formation of busts, medals, and statues.

Specula of telescopes.

Melt 7 lbs. of copper, and when fused, add 3 lbs. of zinc, and 4 lbs. of tin. These metals will combine to form a beautiful alloy of great lustre, and of a light yellow colour, fitted to be made into specula for telescopes. Mr. Mudge used only copper and grain tin, in the proportion of 2 lbs. to 14 1-2 ounces.

Gun metal.

Melt together 112 lbs. of Bristol brass, 14 lbs. of spelter, and 7 lbs. of block tin.

Another.

Melt together 9 parts of copper, and 1 part of tin: the above compounds are those used in the manufacture of small and great brass guns, swivels, &c.

The pieces of ordnance used by the besiegers at the battle of Prague, were actually melted by the frequency of the firing; the mixture of which they were made contained a large portion of lead; it would have been less prone to melt, and consequently preferable, had it contained none. A mixture of copper, and tin is preferred to pure copper, not only for the casting of cannon, but of statues, &c.; for pure copper, in running through the various parts of the mould, would lose so much of its heat as to *set*, or become solid too soon.

Bell metal.

Melt together 6 parts of copper, and 2 of tin: These proportions are the most approved for bells throughout Europe, and in China.

In the union of the two metals above mentioned, the combination is so complete, that the specific gravity of the alloy is greater than that of the two metals uncombined.

Another.

Some bells are made in the proportion of 10 parts of copper to 2 of tin. It may be in general observed, that a less proportion of tin is used for making church bells, than clock bells; and that a little zinc is added for the bells of repeating watches and other small bells.

Blanched copper.

Melt together 8 ounces of copper, and 1-2 an ounce of neutral arsenical salt fused together, under a flux composed of calcined borax, charcoal dust, and fine powder glass.

Composition of ancient statues.

According to Pliny, the metal used by the Romans for their statues, and for the plates on which they engraved inscriptions, was composed in the following manner. They first melted a quantity of copper, into which they put a third of its weight of old copper, which had been long in use; to every 100 lbs. weight of this mixture they added 12 1-2 lbs. of an alloy composed of equal parts of lead and tin.

Mock platina.

Melt together 8 ounces of brass and 5 ounces of spelter.

Fine casting of brass, &c.

The principal object in fine casting is to have a mould that shall receive a beautiful impression, and at the same time sufficiently adhesive to resist the force of the fluid metal, that shall neither wash, nor be injured by the heat. The sand that covers or surrounds the model should be fine close sand; after removing the mould, the model must be faced with burnt rotten stone, and covered with loam, each dusted through a bag, and the mould laid down upon it—this facing may be repeated, the mould must be dried and smoked with a torch; in lieu of water, the sand is moistened with a solution of tartar, or the lees of wine, or with cream of tartar. Care must be taken to loosen the bands quickly: viz. loosen the first mould, while the second is pouring, &c. On removing the work, every particle of the facing should be carefully scraped from the mould and thrown away. Part the moulds with coal and black rosin.

Gilding metal.

Melt together 4 parts of copper, 1 of Bristol old brass, and 14 oz. of tin, to every pound of copper.

For common jewellery.

Melt together 3 parts of copper, 1 of Bristol old brass, and 4 oz. of tin, to every pound of copper.

If this alloy is for fine polishing, the tin may be omitted, and a mixture of lead and antimony substituted. Paler polishing metal is made by reducing the copper to two or to one part.

Yellow dipping metal.

Melt together 2 parts of Cheadle brass, 1 part of copper, with a little Bristol old brass, and 1-4 oz. of tin to every pound of copper.

This alloy is almost of the colour, &c. of gold coin. Cheadle brass is the darkest, and gives the metal a greenish hue. Old Bristol brass is pale and yellow.

Another.

Good dipping metal may be made of 1 pound of copper to 5 oz. of spelter; the copper should be tough cake, and not tile.

When antimony is used instead of tin it should be in smaller quantity, or the metal will be brittle.

Imitation of silver.

When copper is melted with tin, about 3-4 oz. of tin to a pound of copper, will make a pale bell-metal, they will roll and ring very near to sterling silver.

Tutania or Britannia metal.

Melt together 4 oz. of plate brass, and 4 oz. of tin. When in fusion, add 4 oz. bismuth, and 4 oz. regulus of antimony.

This is the hardening, which is to be added at discretion to melted tin, until it has the requisite colour and hardness.

Another.

Melt together 2 lbs. of plate brass, 2 lbs. of a mixture of copper and arsenic, either by cementation or melting, 2 lbs. of tin, 2 lbs. of bismuth, and 2 lbs. regulus of antimony.

This is to be added at discretion to melted tin.

Another.

Melt together 1 lb. copper, 1 lb. tin, and 2 lbs. regulus of antimony, with or without a little bismuth.

Another.

Melt together 8 oz. Shruff brass, 2 lbs. regulus of antimony, and 10 lbs. of tin.

This is fit for use as Britannia metal.

German tutania.

Melt together 2 drachms of copper, 1 oz. of regulus of antimony, and 12 oz. of tin.

Spanish tutania.

To 8 oz. of scrap iron or steel, at a white heat, add 1 lb. of antimony in small portions, with 3 oz. of nitre. Melt and harden 1 lb. of tin with 2 oz. of this compound.

Another.

Melt together 4 oz. of antimony, 1 oz. arsenic, and 2 lbs. tin. This compound is ready for use. The first of these Spanish alloys would be a beautiful metal, if arsenic were added.

Engestroom tutania.

Melt together 4 parts copper, 8 parts regulus of antimony, and 1 part bismuth.

When added to 100 parts of tin, this compound will be ready for use.

Kustitien's metal for tinning.

To 1 lb. of malleable iron, at a white heat, add 5 oz. regulus of antimony, and 24 lbs. of the purest Molucca tin.

This alloy polishes without the blue tint, and is free from lead or arsenic.

Solder for steel joints.

Take of fine silver, 19 pennyweights, copper, 1 do. and brass, 2 do. Melt these under a coat of charcoal dust.

This solder possesses several advantages over the usual spelter solder, or brass, when employed in soldering cast steel, &c. as it fuses with less heat, and its whiteness has a better appearance than brass.

Brass solder for iron.

Thin plates of brass are to be melted between the pieces that are to be joined. If the work be very fine, as when two leaves of a broken saw are to be brazed together, cover it with pulverized borax, melted with water; that it may incorporate with the brass powder which is added to it: the piece must be then exposed to the fire without touching the coals, and heated till the brass is seen to run.

Silver solder for jewellers.

Melt together 19 pennyweights of fine silver; copper, 1 pennyweight; and brass, 10 pennyweights.

Silver solder for plating.

Melt together 10 pennyweights of brass, and 1 oz. of pure silver.

Gold solder.

Melt together of pure gold, 12 pennyweights; pure silver, 2 pennyweights; and copper, 4 pennyweights.

Useful alloy of gold with platinum.

Put into a clean cruible 7 drachms and a half of pure gold, and when perfectly melted, throw in half a drachm of platinum. The two metals will combine intimately, forming an alloy rather whiter than pure gold, but remarkably *ductile* and *elastic;* it is also less perishable than pure gold or jewellers' gold; but more readily fusible than that metal.

These excellent qualities must render this alloy an object of great interest to workers in metals. For *springs*, where steel cannot be used, it will prove exceedingly advantageous.

It is a curious circumstance, that the alloy of gold and platinum is soluble in nitric acid, which does not act on either of the metals, in a separate state. It is remarkable, too, that the alloy has very nearly the colour of platinum, even when composed of eleven parts of gold to one of the former metal.

Ring gold.

Melt together of Spanish copper 6 pennyweights and 12 grains; fine silver, 3 pennyweights and 16 grains, to one ounce five pennyweights of gold coin. This is worth about 3*l.* per ounce.

Gold from 35s. to 40s. per ounce.

Melt together 8 ounces and 8 pennyweights of Spanish copper, 10 pennyweights of fine silver, to one ounce of gold coin.

Manheim-gold or similar.

Melt together 3 ounces and a half of copper, one ounce and a half of brass, and 15 grains of pure tin.

Preparation of foils.

Foils are thin plates or leaves of metal that are put under stones or compositions in imitation of stones, when they are set.

The intention of foils is either to increase the lustre or play of the stones, or more generally to improve the colour, by giving an additional force to the tinge, whether it be natural or artificial, by that of a ground of the same hue, which the foil is in this case made to be.

There are consequently two kinds of foils; the one is colourless, where the effect of giving lustre or play to the stone is produced by the polish of the surface, which makes it act as a mirror, and, by reflecting the light, prevents that deadness which attends the having a duller ground under stone, and brings it, by the double refraction of the light that is caused, nearer to the effect of the diamond. The other is coloured with some pigment or stain of the same hue as the stone, or of some other which is intended to modify and change the hue of the stone in some degree; as, where a yellow foil may be put under green, which is too much inclining to the blue, or under crimson, where it is desired to have the appearance more orange or scarlet.

Foils may be made of copper or tin; and silver has been sometimes used, with which it has been advised, for some purpose, to mix gold, but the expense of either is needless, as copper may be made to answer the same end.

To prepare copper for foils.

Where coloured foils are wanted, copper may therefore be best used, and may be prepared for the purpose by the following means.

Take copper plates beaten to a proper thickness, and pass them betwixt a pair of fine steel rollers very close set, and draw them as thin as is possible to retain a proper tenacity. Polish them with very fine whiting, or rotten stone, till they shine, and have as much brightness as can be given them, and they will then be fit to receive the colour.

To whiten foils.

Where the yellow, or rather orange-colour of the ground would be injurious to the effect, as in the case of purples, or crimson red, the foils should be whitened, which may be done by the following manner.

Take a small quantity of silver, and dissolve it in *aqua fortis*, and then put bits of copper into the solution, and precipitate the silver; which being done the fluid must be poured off, and fresh water added to it, to wash away all the remainder of the first fluid; after which the silver must be dried, an equal weight of cream of tartar and common salt must then be ground with it, till the whole be reduced to a very fine powder; and with this mixture, the foils, being first slightly moistened, must be rubbed by the finger, or a bit of linen rag, till they be of the degree of whiteness desired; after which, if it appear to be wanted, the polish must be refreshed.

The tin foils are only used in the case of colourless stones, where quicksilver is employed; and they may be drawn out by the same rollers, but need not be further polished, so that effect is produced by other means in this case.

Foils for crystals, pebbles, or paste, to give the lustre and play of diamonds.

The manner of preparing foils, so as to give colourless stones the greatest degree of play and lustre, is by raising so high a polish or smoothness on the surface, as to give them the effect of a mirror, which can only be done, in a perfect manner, by the use of quicksilver, applied in the same general way as in the case of looking-glass. The method by which it may be best performed is as follows.

Take leaves of tin, prepared in the same manner as for silvering looking-glasses, and cut them into small pieces of such size as to cover the surface of the sockets or stones that are to be set. Lay three of these then one upon another, and having moistened the inside of the socket with thin gum-water, and suffered it to become again so dry, that only a slight stickiness remains, put the three pieces of leaves, lying on each other, into it, and adapt them to the surface, in as even a manner as possible. When this is done, heat the socket, and fill it with warm quicksilver, which must be suffered to continue in it three or four minutes, and then gently poured out. The stone must then be thrust into the socket, and closed with it, care having been taken to give such room for it that it may enter without stripping off the tin and quicksilver from any part of the furnace. The work should be well closed round the stone, to prevent the tin and quicksilver contained in the socket from being shaken out by any violence.

The lustre of stones set in this manner will continue longer than when they are set in the common way, as the cavity round them being filled there will be no passage found for moisture, which is so injurious to the wear of stones treated in any other way.

This kind of foil likewise gives some lustre to glass or other transparent matter, which has little of itself; but to stones or pastes, that have some share of play, it gives a most beautiful brilliance.

To colour foils.

Two methods have been invented for colouring foils; the one by tinging the surface of the copper of the colour required by means of smoke, the other by staining or painting it with some pigment or other colouring substance.

The colours used for painting foils may be tempered with either oil, water rendered duly viscid by gum arabic, size, or varnish. Where deep colours are wanted, oil is most proper, because some pigments become wholly transparent in it, as lake, or Prussian blue; but yellow and green may be better laid on in varnish, as these colours may be had in perfection from a tinge wholly dissolved in spirit of wine, in the same manner as in the case of lacquers; and the most beautiful green is to be produced by distilled verdigrise, which is apt to lose its colour and turn black with oil. In common cases, however, any of the colours may be, with least trouble, laid on with isinglass size, in the same manner as the glazing colours used in miniature painting.

Ruby colours.

For red, where the ruby is to be imitated, carmine, a little lake used in isinglass size, or shell-lac varnish, is to be employed, if the glass or paste be of a full crimson, verging towards the purple; but if the glass incline to the scarlet, or orange, very bright lake (that is, not purple) may be used alone in oil.

Garnet red.

For the garnet red, dragon's blood dissolved in seed-lac varnish may be used; and for the vinegar garnet, the orange lake, tempered with shell-lac varnish, will be found excellent.

Amethyst.

For the amethyst, lake, with a little Prussian blue, used with oil, and very thinly spread on the foil, will completely answer the end.

Blue.

For blue, where a deep colour, or the effect of the sapphire is wanted, Prussian blue, that is not too deep, should be used in oil, and it should be spread more or less thinly on the foil according to the lightness or deepness of which the colour is required to be.

Eagle marine.

For the eagle marine, common verdigrise, with a little Prussian blue, tempered in shell-lac varnish, may be used.

Yellow.

Where a full yellow is desired, the foil may be coloured with yellow lacquer, laid on as for other purposes; and for the slighter colour of topazes the burnish and foil itself will be sufficiently strong without any addition.

Green.

For green, where a deep hue is required, the crystals of verdigrise, tempered in shell-lac varnish, should be used, but where the emerald is to be imitated, a little yellow lacquer, should be added, to bring the colour to a truer green, and less verging to the blue.

Other colours.

The stones of more diluted colours, such as the amethyst, topaz, vinegar-garnet, and eagle marine, may be very cheaply imitated by transparent white glass or paste, even without foils. This is to be done by tempering the colours above enumerated with turpentine and mastic, and painting the socket in which the counterfeit stone is to be set with the mixture, the socket and stone itself being previously heated. In this case, however, the stone should be immediately set, and the socket closed upon it before the mixture cools and grows hard. The orange lake above-mentioned was invented for this purpose, in which it has a beautiful effect, and was used with great success by a considerable manufacturer. The colour it produces is that of the vinegar-garnet, which it affords with great brightness. The colours before directed to be used in oil should be extremely well ground in oil of turpentine, and tempered with old nut or poppy oil; or, if time can be given for the drying, with strong fat oil; diluted with spirit of turpentine, which will gain a fine polish of itself.

The colours used in varnish should be likewise thoroughly well ground and mixt; and, in the case of the dragon's blood in the seed-lac varnish and the lacquer, the foils should be warmed before they are laid out. All the mixtures should be laid on the foils with a broad soft brush, which must be passed from one end to the other, and no part should be crossed, or twice gone over, or, at least, not till the first coat can be dry; when, if the colour do not lie strong enough, a second coat may be given.

GILDING, SILVERING, AND TINNING.

To gild glass and porcelain.

Drinking, and other glasses are sometimes gilt on their edges. This is done, either by an adhesive varnish, or by heat. The varnish is prepared by dissolving in boiled linseed oil an equal weight either of copal or amber. This is to be diluted by a proper quantity of oil of turpentine, so as to be applied as thin as possible to the parts of the glass intended to be gilt. When this is done, which will be in about 24 hours, the glass is to be placed in a a stove, till it is so warm as almost to burn the fingers when handled. At this temperature, the varnish will become adhesive, and a piece of leaf gold, applied in the usual way, will immediately stick. Sweep off the superfluous portions of the leaf; and when quite cold, it may be burnished, taking care to interpose a piece of very thin paper (Indian paper) between the gold and the burnisher. If the varnish is very good, this is the best method of gilding glass, as the gold is thus fixed on more evenly, than in any other way.

Another method.

It often happens, when the varnish is but indifferent, that by repeated washing the gold wears off: on this account the practice of burning it in, is sometimes had recourse to.

For this purpose, some gold powder is ground with borax, and in this state applied to the clean surface of the glass, by a camel's hair pencil; when quite dry, the glass is put into a stove heated to about the temperature of an annealing oven; the gum burns off, and the borax, by vitrifying, cements the gold with great firmness to the glass; after which it may be burnished. The gilding upon porcelain is in like manner fixed by heat and the use of borax; and this kind of ware being neither transparent nor liable to soften, and thus to be injured in its form in a lowered heat, is free from the risk and injury which the finer and more fusible kinds of glass are apt to sustain from such treatment. Porcelain and other wares may be platinized, silvered, tinned, and bronzed, in a similar manner.

To gild leather.

In order to impress gilt figures, letters, and other marks upon leather, as on the covers of books, edgings for doors, &c. the leather must first be dusted over with very finely powdered yellow resin, or mastich gum. The iron tools or stamps are now arranged on a rack before a clear fire, so as to be well heated, without becoming red hot. If the tools are *letters*, they have an alphabetical arrangement on the rack. Each letter or stamp must be tried as to its heat, by imprinting its mark on the raw side of a piece of waste leather. A little practice will enable the workmen to judge of the heat. The tool is now to be pressed downwards on the gold leaf; which will of course be indented, and show the figure imprinted on it. The next letter or stamp is now to be taken and stamped in like manner, and so on with the others; taking care to keep the letters in an even line with each other, like those in a book. By this operation, the resin is melted; consequently the gold adheres to the leather; the superfluous gold may then be rubbed off by a cloth; the gilded impressions remaining on the leather. In this, as in every other operation, adroitness is acquired by practice.

The cloth alluded to should be slightly greasy, to retain the gold wiped off: (otherwise there will be great waste in a few months,) the cloth will thus be soon completely saturated or loaded with the gold. When this is the case, these cloths are generally sold to the refiners, who burn them and recover the gold. Some of these afford so much gold by burning, as to be worth from a guinea to a guinea and a half.

To gild writings, drawings, &c. on paper or parchment.

Letters written on vellum or paper are gilded in three ways: in the first, a little size is mixed with the ink, and the letters are written as usual; when they are dry, a slight degree of stickiness is produced by breathing on them, upon which the gold leaf is immediately applied, and by a little pressure may be made to adhere with sufficient firmness. In the second method, some white-lead or chalk is ground up with strong size, and the letters are made with this by means of a brush: when the mixture is almost dry, the gold leaf may be laid on, and afterwards burnished. The last method is to mix up some gold powder with size, and to form the letters of this by means of a brush. It is supposed that this latter method was that used by the monks in illuminating their missals, psalters, and rubrics.

To gild the edges of paper.

The edges of the leaves of books and letter paper are gilded, whilst in a horizontal position in the bookbinder's press, by first applying a composition formed of four parts of Armenian bole, and one of candied sugar, ground together with water to a proper consistence, and laid on a brush with the white of an egg. This coating, when nearly dry, is smoothed by the burnisher; which is generally a crooked piece of agate, very smooth, and fixed in a handle. It is then slightly moistened by a sponge dipped in clean water, and squeezed in the hand. The gold leaf is now taken upon a piece of cotton from the leathern cushion, and applied on the moistened surface. When dry, it is to be burnished by rubbing the agate over it repeatedly from end to end, taking care not to wound the surface by the point of the burnisher. A piece of silk or India paper is usually interposed between the gold and the burnisher.

Cotton wool is generally used by bookbinders to take the leaf up from the cushion; being the best adapted for the purpose on account of its pliability, smoothness, softness, and slight moistness.

To gild silk, satin, ivory, &c. by hydrogen gas.

Immerse a piece of white satin, silk, or ivory in a solution of nitro-muriate of gold, in the proportion of one part of the nitro-muriate to three of distilled water. Whilst the substance to be gilded is still wet, immerse it in a jar of hydrogen gas; it will soon be covered by a complete coat of gold.

Another method.

The foregoing experiment may be very prettily and advantageously varied as follows:—Paint flowers or other ornaments with a very fine camel hair pencil, dipped in the above mentioned solution of gold, on pieces of silk, satin, &c. &c. &c. and hold them over a Florence flask, from which hydrogen gas is evolved, during the decomposition of the water by sulphuric acid and iron filings. The painted flowers, &c. in a few minutes, will shine with all the splendour of the purest gold. A coating of this kind will not tarnish on exposure to the air, or in washing.

Oil gilding on wood.

The wood must first be covered, or primed, by two or three coatings of boiled linseed oil, and carbonate of lead, in order to fill up the pores, and conceal the irregularities of the surface, occasioned by the veins in the wood. When the priming is quite dry, a thin coat of gold-size must be laid on. This is prepared by grinding together some red oxide of lead with the thickest drying oil that can be procured, and the older the better, that it may work freely; it is to be mixed, previously to being used, with a little oil of turpentine, till it is brought to a proper consistence. If the gold-size is good, it will be sufficiently dry in twelve hours, more or less, to allow the artist to proceed to the last part of the process, which is the application of the gold. For this purpose a leaf of gold is spread on a cushion (formed by a few folds of flannel secured on a piece of wood, about eight inches square, by a tight covering of leather,) and is cut into strips of a proper size by a blunt pallet knife; each strip being then taken upon the point of a fine brush, is applied to the part intended to be gilded, and is then gently pressed down by a ball of soft cotton; the gold immediately adheres to the sticky surface of the size, and after a few minutes, the dexterous application of a large camel's hair brush sweeps away the loose particles of the gold leaf without disturbing the rest. In a day or two the size will be completely dried, and the operation will be finished.

The advantages of this method of gilding are, that it is very simple, very durable, and not readily injured by changes of weather, even when exposed to the open air; and when soiled it may be cleaned by a little warm water and a soft brush: its chief employment is in outdoor work. Its disadvantage is, that it cannot be burnished, and therefore wants the high lustre produced by the following method.

To gild by burnishing.

This operation is chiefly performed on picture frames, mouldings, beadings, and fine stucco work. The surface to be gilt must be carefully covered with a strong size, made by boiling down pieces of white leather, or clippings of parchment, till they are reduced to a stiff jelly; this coating being dried, eight or ten more must be applied, consisting of the same size, mixed with fine Paris plaister or washed chalk; when a sufficient number of layers have been put on, varying according to the nature of the work, and the whole is become quite dry, a moderately thick layer must be applied, composed of size and Armenian bole, or yellow oxide of lead: while this last is yet moist, the gold leaf is to be put on in the usual manner; it will immediately adhere on being pressed by the cotton ball, and before the size is become perfectly dry, those parts which are intended to be the most brilliant are to be carefully burnished by an agate or a dog's tooth fixed in a handle.

In order to save the labour of burnishing, it is a common, but bad practice, slightly to burnish the brilliant parts, and to deaden the rest by drawing a brush over them dipped in size; the required contrast between the polished and the unpólished gold is indeed thus obtained; but the general effect is much inferior to that produced in the regular way, and the smallest drop of water falling on the sized part occasions a stain. This kind of gilding can only be applied on in-door work; as rain, and even a considerable degree of dampness, will occasion the gold to peal off. When dirty, it may be cleaned by a soft brush, with hot spirit of wine, or oil of turpentine.

To gild copper, &c. by amalgam.

Immerse a very clean bright piece of copper in a diluted solution of nitrate of mercury. By the affinity of copper for nitric acid, the mercury will be precipitated: now spread the amalgam of gold, rather thinly, over the coat of mercury just given to the copper. This coat unites with the amalgam, but of course will remain on the copper. Now place the piece or pieces so operated on in a clean oven or furnace, where there is no smoke. If the heat is a little greater than 660°, the mercury of the amalgam will be volatilized, and the copper will be beautifully gilt.

In the large way of gilding, the furnaces are so contrived that the volatilized mercury is again condensed, and preserved for further use, so that there is no loss in the operation. There is also a contrivance by which the volatile particles of mercury are prevented from injuring the gilders.

To gild steel.

Pour some of the etherial solution of gold into a wine glass, and dip therein the blade of a new pen-knife, lancet, or razor; withdraw the instrument, and allow the ether to evaporate. The blade will be found to be covered by a very beautiful coat of gold. A clean rag, or small piece of very dry sponge, may be dipped in the ether, and used to moisten the blade, with the same result.

In this case there is no occasion to pour the liquid into a glass, which must undoubtedly lose by evaporation; but the rag or sponge may be moistened by it, by applying either to the mouth of the phial. This coating of gold will remain on the steel for a great length of time, and will preserve it from rusting.

This is the way in which swords and other cutlery are ornamented. Lancets too are in this way gilded with great advantage, to secure them from rust.

Gold powder for gilding.

Gold powder may be prepared in three different ways:—put into an earthen mortar some gold leaf, with a little honey, or thick gum-water, and grind the mixture till the gold is reduced to extremely minute particles. When this is done, a little warm water will wash out the honey or gum, leaving the gold behind in a pulverulent state.

Another.

Another way, is, to dissolve pure gold, (or the leaf,) in nitro-muriatic acid, and then to precipitate it by a piece of copper, or by a solution of sulphate of iron. The precipitate (if by copper, must be digested in distilled vinegar, and then washed, (by pouring water over it repeatedly,) and dried. This precipitate will be in the form of a very fine powder: it works better, and is more easily burnished than gold leaf ground with honey as above.

Another.

The best method of preparing gold powder, is by heating a prepared amalgam of gold, in an open clean crucible, and continuing the strong heat until the whole of the mercury is evaporated; at the same time constantly stirring the amalgam with a glass rod. When the mercury has completely left the gold, the remaining powder is to be ground in a Wedgewood's mortar, with a little water, and afterwards dried. It is then fit for use.

Although the last mode of operating has been here given, the operator cannot be too much reminded of the danger attending the sublimation of mercury. In the small way here described, it is impossible to operate without danger; it is therefore better to prepare it according to the former directions, than to risk the health by the latter.

To cover bars of copper, &c. with gold, so as to be rolled out into sheets.

This method of *gilding* was invented by Mr. Turner of Birmingham. Mr. Turner first prepares ingots or pieces of copper or brass, in convenient lengths and sizes. He then cleans them from impurity, and makes their surfaces level, and prepares plates of pure gold, or gold mixed with a portion of alloy, of the same size as the ingots of metal, and of suitable thickness. Having placed a piece of gold upon an ingot intended to be plated, he hammers and compresses them both together, so that they may have their surfaces as nearly equal to each other as possible; and then binds them together with wire, in order to keep them in the same position during the process required to attach them. Afterwards he takes silver filings, which he mixes with borax, to assist the fusion of the silver. This mixture he lays upon the edge of the plate of gold, and next to the ingot of metal. Having thus prepared the two bodies, he places them on a fire in a stove or furnace, where they remain until the silver and borax placed along the edges of the metals melt, and until the adhesion of the gold with the metal is perfect. He then takes the ingot carefully out of the stove. By this process the ingot is plated with gold, and prepared ready for rolling into sheets.

To silver copper ingots.

The principal difficulties in plating copper ingots are, to bring the surfaces of the copper and silver into fusion at the same time; and to prevent the copper from scaling; for which purposes fluxes are used. The surface of the copper on which the silver is to be fixed must be made flat by filing, and should be left rough. The silver is first annealed, and afterwards pickled in weak spirit of salt; it is planished, and then scraped on the surface to be fitted on the copper. These prepared surfaces are anointed with a solution of borax, or strewed with fine powdered borax itself, and then confined in contact with each other, by binding wire. When they are exposed to a sufficient degree of heat, the flux causes the surfaces to fuse at the same time, and after they become cold, they are found firmly united.

Copper may likewise be plated by heating it, and burnishing leaf-silver upon it; so may iron and brass. This process is called *French plating*.

To gild in colours.

The principal colours of gold for gilding are red, green, and yellow. These should be kept in different amalgams. The part which is to remain of the first colour, is to be stopped off with a composition of chalk and glue; the variety required is produced by gilding the unstopped parts with the proper amalgam, according to the usual mode of gilding.

Sometimes the amalgam is applied to the surface to be gilt, without any quicking, by spreading it with aqua fortis; but this depends on the same principle as a previous quicking.

Grecian gilding.

Equal parts of sal-ammoniac and corrosive sublimate, are dissolved in spirit of nitre, and a solution of gold made with this menstruum. The silver is brushed over with it, which is turned black, but on exposure to a red heat, it assumes the colour of gold.

To dissolve gold in aqua regia.

Take an aqua regia, composed of two parts of nitrous acid, and one of marine acid; or of one part of sal-ammoniac, and four parts of aqua fortis; let the gold be granulated, put into a sufficient quantity of this menstruum, and exposed to a moderate degree of heat. During the solution an effervescence takes place, and it acquires a beautiful yellow colour, which becomes more and more intense, till it has a golden or even orange colour. When the menstruum is saturated, it is very clear and transparent.

To gild iron or steel with a solution of gold.

Make a solution of 8 ounces of nitre and common salt, with 5 ounces of crude alum in a sufficient quantity of water; dissolve half an ounce of gold thinly plated and cut; and afterwards evaporate to dryness. Digest the residuum in rectified spirit of wine or ether, which will perfectly abstract the gold. The iron is brushed over with this solution and becomes immediately gilt.

To gild, by dissolving gold in aqua regia.

Fine linen rags are soaked in a saturated solution of gold in aqua regia, gently dried, and afterwards burnt to tinder. The substance to be gilt must be well polished; a piece of cork is first dipped into a solution of common salt in water, and afterwards into the tinder, which is well rubbed on the surface of the metal to be gilt, and the gold appears in all its metallic lustre.

Amalgam of gold, in the large way.

A quantity of quicksilver is put into a crucible or iron ladle, which is lined with clay and exposed to heat till it begins to smoke. The gold to be mixed should be previously granulated, and heated red hot, when it should be added to the quicksilver, and stirred about with an iron rod till it is perfectly dissolved. If there should be any superfluous mercury, it may be separated by passing it through clean soft leather; and the remaining amalgam will have the consistence of butter, and contain about three parts of mercury to one of gold.

To gild by amalgamation.

The metal to be gilt is previously well cleaned on its surface, by boiling it in a weak pickle, which is a very dilute nitrous acid. A quantity of aqua fortis is poured into an earthen vessel, and quick silver put therein; when a sufficient quantity of mercury is dissolved, the articles to be gilt are put into the solution, and stirred about with a brush till they become white. This is called quicking. But, as during quicking by this mode, a noxious vapour continually arises, which proves very injurious to the health of the workman, they have adopted another method, by which they, in a great measure, avoid that danger. They now dissolve the quicksilver in a bottle containing aqua fortis, and leave it in the open air during the solution, so that the noxious vapour escapes into the air. Then a little of this solution is poured into a basin, and with a brush dipped therein, they stroke over the surface of the metal to be gilt, which immediately becomes quicked. The amalgam is now applied by one of the following methods: viz.

1st. By proportioning it to the quantity of articles to be gilt, and putting them into a white hat together, working them about with a soft brush, till the amalgam is uniformly spread.

Or, 2dly. By applying a portion of the amalgam upon one part, and spreading it on the surface, if flat, by working it about with a harder brush.

The work thus managed is put into a pan, and exposed to a gentle degree of heat; when it becomes hot, it is frequently put into a hat, and worked about with a painter's large brush, to prevent an irregular dissipation of the mercury, till, at last, the quicksilver is entirely dissipated by a repetition of the heat, and the gold is attached to the surface of the metal. This gilt surface is well cleaned by a wire brush, and then artists heighten the colour of the gold by the application of various compositions; this part of the process is called *colouring*.

To silver by heat.

Dissolve an ounce of pure silver in aqua fortis, and precipitate it with common salt; to which add 1-2 pound of sal ammoniac, sandiver, and white vitriol, and 1-4 oz. of sublimate.

Another method.

Dissolve an ounce of pure silver in aqua fortis; precipitate it with common salt, and add, after washing, 6 ounces of common salt, 3 ounces each of sandiver and white vitriol, and 1-4 ounce of sublimate.

These are to be ground into a paste upon a fine stone with a muller; the substance to be silvered must be rubbed over with a sufficient quantity of the paste, and exposed to a proper degree of heat. Where the silver runs, it is taken from the fire, and dipped into weak spirit of salt to clean it.

Silvering on gilt work, by amalgamation.

Silver will not attach itself to any metal by amalgamation, unless it be first gilt. The process is the same as gilding in colours, only no acid should be used.

To silver in the cold way.

Take two drachms of each, tarter and common salt; 1-2 a drachm of alum, and 20 grains of silver, precipitated from the nitrous acid by copper; make them into a paste with a little water. This is to be rubbed on the surface to be silvered with a cork, &c.

Another method.

Dissolve pure silver in aqua fortis, and precipitate the silver with common salt; make this precipitate into a paste, by adding a little more salt and cream of tartar. It is applied as in the former method.

To separate the silver from plated copper.

This process is applied to recover the silver from the plated metal, which has been rolled down for bottons, toys, &c. without destroying any large portion of the copper. For this purpose, a menstruum is composed of 3 pounds of oil of vitriol, 1 1-2 ounce of nitre, and a pound of water. The plated metal is boiled in it till the silver is dissolved, and then the silver is recovered by throwing common salt into the solution.

To assay plated metals.

Take a determinate quantity of the plated metal; put it into an earthen vessel, with a sufficient quantity of the above menstruum, and place it in a gentle heat. When the silver is stripped, it must be collected with common salt; the calx must be tested with lead, and the estimate made according to the product of silver.

To plate iron.

Iron may be plated by three different modes.

1st. By polishing the surface very clean and level with a burnisher: and afterwards by exposing it to a blueing heat, a leaf of silver is properly placed and carefully burnished down. This is repeated till a sufficient number of leaves are applied, to give the silver a proper body.

2d. By the use of a solder; slips of thin solder are placed between the iron and silver, with a little flux, and secured together by binding wire. It is then placed in a clear fire, and continued in it till the solder melts; when it is taken out, and on cooling is found to adhere firmly.

And 3d. By tinning the iron first, and uniting the silver by the intermedia of slips of rolled tin, brought into fusion in a single heat.

To heighten the colour of yellow gold.

Take of salt petre, 6 oz. green copperas, 2 oz. white vitriol and alum, of each, 1 oz.

If it be wanted redder, a small portion of blue vitriol must be added. These are to be well mixed, and dissolved in water as the colour is wanted.

To heighten the colour of green gold.

Take of salt petre, 1 oz. 10 dwts. sal ammoniac, 1 oz. 4 dwts. Roman vitriol, 1 oz. 4 dwts. verdigris, 18 dwts. Mix them well together, and dissolve a portion in water, as occasion requires.

The work must be dipped in these compositions, applied to a proper heat to burn them off, and then quenched in water or vinegar.

To heighten the colour of red gold.

To 4 oz. of melted yellow wax, add, in fine powder, 1 1-2 oz. of red ochre, 1 1-2 oz. of verdigris, calcined till it yield no fumes, and 1-2 an oz. of calcined borax; mix them well together. It is necessary to calcine the verdigris, or else, by the heat applied in burning the wax, the vinegar becomes so concentrated as to corrode the surface, and make it appear speckled.

To separate gold from gilt copper and silver.

Apply a solution of borax, in water, to the gilt surface, with a fine brush, and sprinkle over it some fine powdered sulphur. Make the piece red hot, and quench it in water. The gold may be easily wiped off with a scratch-brush, and recovered by testing it with lead.

Gold is taken from the surface of silver by spreading over it a paste, made of powdered sal ammoniac, with aqua fortis, and heating it till the matter smokes, and is nearly dry; when the gold may be separated by rubbing it with a scratch-brush.

To tin copper and brass.

Boil six pounds of cream of tartar, four gallons of water, and eight pounds of grain tin, or tin shavings. After the materials have boiled a sufficient time, the substance to be tinned is put therein, and the boiling continued, when the tin is precipitated in its metallic form.

To tin iron or copper vessels.

Iron which is to be tinned, must be previously steeped in acid materials, such as sour whey, distillers' wash, &c.; then scoured, and dipped in melted tin, having been first rubbed over with a solution of sal ammoniac. The surface of the tin is prevented from calcining, by covering it with a coat of fat. Copper vessels must be well cleansed; and then a sufficient quantity of tin with sal ammoniac is put therein, and brought into fusion, and the copper vessel moved about. A little resin is sometimes added. The sal ammoniac prevents the copper from scaling, and causes the tin to be fixed wherever it touches. Lately, zinc has been proposed for lining vessels instead of tin, to avoid the ill consequences which have been unjustly apprehended.

To prepare the leaden tree.

Put half an ounce of the super-acetate of lead in powder, into a clear glass globe or wine decanter, filled to the bottom of the neck with distilled water, and 10 drops of nitric acid, and shake the mixture well. Prepare a rod of zinc with a hammer and file, so that it may be a quarter of an inch thick, and one inch long; at the same time form notches in each side for a thread, by which it is to be suspended, and tie the thread so that the knot shall be uppermost, when the metal hangs quite perpendicular. When it is tied, pass the two ends of the thread through a perforation in the cork, and let them be again tied over a small splinter of wood which may pass between them and the cork. When the string is tied, let the length between the cork and the zinc be such that the precipitant (the zinc) may be at equal distances from the sides, bottom and top, of the vessel, when immersed in it. When all things are thus prepared, place the vessel in a place where it may not be disturbed, and introduce the zinc, at the same time fitting in the cork. The metal will very soon be covered with the lead, which it precipitates from the solution, and this will continue to take place until the whole be precipitated upon the zinc, which will assume the form of a tree or bush, whose leaves and branches are laminal, or plates of a metallic lustre.

To prepare the tin tree.

Into the same, or a similar vessel to that used in the last experiment, pour distilled water as before, and put in three drachms of muriate of tin, adding ten drops of nitric acid, and shake the vessel until the salt be completely dissolved. Replace the zinc (which must be cleared from the effects of the former experiment,) as before, and set the whole aside to precipitate without disturbance. In a few hours, the effect will be similar to the last, only that the tree of tin will have more lustre. In these experiments, it is surprising to observe the laminæ shoot out as it were from nothing; but this phenomenon seems to proceed from a galvanic action of the metals and the water.

To prepare the silver tree.

Pour into a glass globe or decanter, four drachms of nitrate of silver, dissolved in a pound or more of distilled water, and lay the vessel on the chimney piece, or in some place where it may not be disturbed. Now pour in 4 drachms of mercury. In a short time the silver will be precipitated in the most beautiful arborescent form, resembling real vegetation. This has been generally termed the Arbor Dianæ.

Metallic watering, or for blanc moire.

This article, of Parisian invention, which is much employed to cover ornamental cabinet work, dressing boxes, telescopes, opera glasses, &c. &c. is prepared in the following manner.

Sulphuric acid is to be diluted with from seven to nine parts of water; then dip a sponge or rag into it, and wash with it the surface of a sheet of tin. This will speedily exhibit an appearance of crystallization, which is the moiré.

This effect, however, cannot be easily produced upon every sort of sheet tin, for if the sheet has been much hardened by hammering or rolling, then the moiré cannot be effected until the sheet has been heated so as to produce an incipient fusion on the surface, after which the acid will act upon it, and produce the moiré. Almost any acid will do as well as the sulphuric, and it is said that the citric acid dissolved in a sufficient quantity of water, answers better than any other.

The moiré may be much improved by employing the blow pipe, to form small and beautiful specks on the surface of the tin, previous to the application of the acid.

When the moiré has been formed, the plate is to be varnished and polished, the varnish being tinted with any glazing colour, and thus the red, green, yellow, and pearl coloured moirés are manufactured.

Chinese sheet lead.

The operation is carried on by two men; one is seated on the floor with a large flat stone before him, and with a moveable flat stone-stand at his side. His fellow workman stands beside him with a crucible filled with melted lead; and having poured a certain quantity upon the stone, the other lifts the moveable stone, and dashing it on the fluid lead presses it out into a flat and thin plate, which he instantly removes from the stone. A second quantity of lead is poured in a similar manner, and a similar plate formed, the process being carried on with singular rapidity. The rough edges of the plates are then cut off, and they are soldered together for use.

Mr. Waddel has applied this method with great success to the formation of thin plates of zinc, for galvanic purposes.

PARTING.

By this process gold and silver are separated from each other. These two metals equally resisting the action of fire and lead, must therefore be separated by other means. This is effected by different menstrua. Nitrous acid, marine acid, and sulphur, which cannot attack gold, operate upon silver; and these are the principal agents employed in this process.

Parting by nitrous acid is most convenient, consequently most used,—indeed, it is the only one employed by goldsmiths. This is called simply parting.

That made by the marine acid is by cementation, and is called centrated parting; and parting by sulphur is made by fusion, and called DRY PARTING.

Parting by aqua fortis.

This process cannot succeed unless we attend to some essential circumstances: 1st. The gold and silver must be in a proper proportion, viz. the silver ought to be three parts to one of gold; though a mass containing two parts of silver to one of gold may be parted. To judge of the quality of the metal to be parted, assayers make a comparison upon a touch-stone, between it and certain needles composed of gold and silver, in graduated proportions, and properly marked; which are called PROOF NEEDLES. If this trial shows that the silver is not to the gold as three to one, the mass is improper for the operation, unless more silver be added; and 2dly, that the parting may be exact, the aqua fortis must be very pure, especially free from any mixture of the vitriolic or marine acid. For if this were not attended to, a quantity of silver proportionable to these two foreign acids would be separated during the solution; and this quantity of sulphate of silver would remain mingled with the gold, which consequently would not be entirely purified by the operation.

The gold and silver to be parted ought previously to be granulated, by melting it in a crucible, and pouring it into a vessel of water, giving the water at the same time a rapid circular motion, by quickly stirring it round with a stick. The vessels generally used in this operation are called parting glasses, which ought to be very well annealed, and chosen free from flaws; as one of the chief inconveniences attending the operation is, that the glasses are apt to crack by exposure to cold, or even when touched by the hand. Some operators secure the bottom of the glasses by a coating composed of a mixture of new-slaked lime, with beer and whites of eggs spread on a cloth, and wrapped round the glasses at the bottom; over which they apply a composition of clay and hair. The parting glasses should be placed in vessels containing water supported by trivets, with a fire under them; because if a glass should break, the contents are caught in the vessel of water. If the heat communicated to the water be too great, it may be properly regulated by pouring cold water gradually and carefully down the side of the vessel into a parting glass 15 inches high, and 10 or 12 inches wide at the bottom; placed in a copper pan 12 inches wide at bottom, 15 inches wide at top, and 10 inches high, there is usually put about 80 ounces of metal, with twice as much of aqua fortis.

The aqua fortis ought to be so strong as to act sensibly on silver, when cold, but not so strong as to act violently. Little heat should be applied at first, as the liquor is apt to swell and rise over the vessel; but when the acid is nearly saturated, the heat may safely be increased. When the solution ceases, which is known by the effervescence discontinuing, the liquor is to be poured off, if any grains appear entire, more aqua fortis must be added, till the silver is all dissolved. If the operation has been performed slowly, the remaining gold will have the form of distinct masses. The gold appears black after parting; its parts have no adhesion together, because the silver dissolved from it has left many interstices. To give them more solidity, and improve their colour, they are put into a test under a muffle, and made red hot, after which they contract and become more solid, and the gold resumes its colour and lustre. It is then called GRAIN GOLD. If the operation has been performed hastily, the gold will have the appearance of black mud or powder, which after well washing, must be melted.

The silver is usually recovered by precipitating it from the aqua fortis by means of pure copper. If the solution be perfectly saturated, no precipitation can take place, till a few drops of aqua fortis are added to the liquor. The precipitate of silver must be well washed with boiling water, and may be fused with nitre, or tested off with lead.

Parting by cementation.

A cement is prepared, composed of four parts of bricks powdered and sifted; of one part of green vitriol calcined till it becomes red; and of one part of common salt; this is to be made into a firm paste with a little water. It is called the CEMENT ROYAL.

The gold to be cemented is reduced into plates as thin as money. At the bottom of the crucible or cementing pot, a stratum of cement, of the thickness of a finger, is put, which is covered with plates of gold; and so the strata are placed alternately. The whole is covered with a lid, which is luted with a mixture of clay and sand. This pot must be placed in a furnace, or oven, heated gradually till it becomes red hot, in which it must be continued during 24 hours. The heat must not melt the gold. The pot or crucible is then suffered to cool; and the gold carefully separated from the cement, and boiled at different times in a large quantity of pure water. It is then assayed upon a touch-stone, or otherwise; and if it be not sufficiently pure, it is cemented a second time. In this process the vitriolic acid of the bricks, and of the calcined vitriol, decomposes the common salt during the cementation, by uniting to its alkaline base, while the marine acid becomes concentrated by heat and dissolves the silver alloyed with the gold. This is a very troublesome process, though it succeeds when the portion of silver is so small that it would be defended from the action of aqua fortis by the superabundant gold: but is little used, except to extract silver, or base metals, from the surface of gold, and thus giving to an alloyed metal, the colour and appearance of pure gold.

Dry parting.

This process is performed by sulphur, which will easily unite with silver, but does not attack gold. As this dry parting is even troublesome, as well as expensive, it ought not to be undertaken but on a considerable quantity of silver alloyed with gold. The general procedure is as follows.—The metal must be granulated; from 1-8 to 1-5 of it (according as it is richer or poorer in the gold,) is reserved, and the rest well mingled with an eighth of powdered sulphur; and put into a crucible, keeping a gentle fire, that the silver, before melting, may be thoroughly penetrated by the sulphur; if the fire be hastily urged, the sulphur will be dissipated. If to sulphurated silver infusion, pure silver be added, the latter falls to the bottom, and forms there a distinct fluid, not miscible with the other. The particles of gold, having no affinity with the sulphurated silver, join themselves to the pure silver wherever they come in contact, and are thus transferred from the former into the latter, more or less perfectly, according as the pure silver was more or less thoroughly diffused through the mixture. It is for this use that a part of the granulated silver was reserved. The sulphurated mass being brought into fusion, and kept melting for nearly an hour in a covered crucible, one third of the reserved grains is thrown in, which, when melted, the whole is well stirred, that the fresh silver may be distributed through the mixed to collect the gold from it; this is performed with a wooden rod. This is repeated till the whole reserved metal be introduced. The sulphurated silver appears, in fusion of a dark brown colour; after it has been kept in fusion for a certain time, a part of the sulphur having escaped from the top, the surface becomes white, and some bright drops of silver about the size of a pea, are perceived on it. When this happens the fire must be immediately discontinued, for otherwise more and more of the silver thus losing its sulphur, would subside and mingle with the part at the bottom, in which the gold is collected. The whole is poured into an iron mortar greased and duly heated. The gold diffused at first through the whole mass, is now found collected in a part of it at the bottom, (amounting only to about as much as was reserved unsulphurated from the mass) by a chisel or hammer; or more perfectly by placing the whole mass with its bottom upwards in a crucible, the sulphurated part quickly melts, leaving, unmelted, that which contains the gold. The sulphurated silver is assayed, by keeping a portion of it in fusion in an open crucible, till the sulphur is dissipated; and then by dissolving it in aqua fortis. If it should still be found to contain gold, it must be subjected to the same treatment as before. The gold thus collected may be concentrated into a smaller part by repeating the whole process, so that at last it may be parted by aqua fortis without too much expense.

IRON AND STEEL.

Expeditious mode of reducing iron ore into malleable iron.

The way of proceeding is by stamping, washing, &c. the calcine and materials, to separate the ore from extraneous matter; then fusing the prepared ore in an open furnace, and instead of casting it, to suffer it to reman at the bottom of the furnace till it becomes cold.

New method of shingling and manufacturing iron.

The ore being fused in a reverberating furnace, is conveyed, while fluid, into an air-furnace, where it is exposed to a strong heat, till a bluish flame is observed on the surface, it is then agitated on the surface, till it loses its fusibility, and is collected into lumps called *loops*. These *loops* are then put into another air-furnace, brought to a white or welding heat, and then *shingled* into *half blooms* or *slabes*. They are again exposed to the air-furnace, and the half-blooms taken out and forged into *anconies*, *bars*, *half-flats* and *rods* for *wire;* while the *slabes* are passed, when of a welding heat, through the grooved rollers. In this way of proceeding, it matters not whether the iron is prepared from *cold*, or *hot short* metal, nor is there any occasion for the use of finery, charcoal, coke, chafery or hollow-fire; or any blast by bellows; or otherwise; or the use of fluxes, in any part of the process.

Approved method of welding iron.

This consists in the skilful *bundling* of the iron to be welded; in the use of an extraordinary large forge-hammer, in employing a *balling-furnace*, instead of a *hollow-fire* or *chafery;* and in passing the iron, reduced to a melting heat, through grooved mill rollers of different shapes and sizes, as required.—*Repertory of Arts,* vol. iii.

Common hardening.

Iron by being heated red hot, and plunged into cold water, acquires a great degree of hardness. This proceeds from the coldness of the water which contracts the particles of the iron into less space.

Case-hardening.

Case-hardening is a superficial conversion of iron into steel by cementation. It is performed on small pieces of iron, by enclosing them in an iron box, containing burnt leather, bone-dust, or any other phlogistic substance; and exposing them for some hours to a red heat. The surface of the iron thus becomes perfectly metallized. Iron thus treated is susceptible of the finest polish.

To convert iron into steel by cementation.

The iron is formed into bars of a convenient size, and then placed in a cementing furnace, with sufficient quantity of cement, which is composed of coals of animal or vegetable substances, mixed with calcined bones, &c. The following are very excellent cements:—1st, one part of powdered charcoal, and half a part of wood-ashes well mixed together; or, 2dly, two parts of charcoal, moderately powdered, one part of bones, horn, hair, or skins of animals, burnt in close vessels to blackness and powdered; and half a part of wood ashes: mix them well together. The bars of iron to be converted into steel, are placed upon a stratum of cement, and covered all over with the same; and the vessel which contains them closely luted, must be exposed to a red heat for 8 or 10 hours, when the iron will be converted into steel.

Steel is prepared from bar iron by fusion; which consists of plunging a bar into melted iron, and keeping it there for some time, by which process it is converted into good steel.

All iron which becomes harder by suddenly quenching in cold water is called steel; and that steel which in quenching acquires the greatest degree of hardness in the lowest degree of heat, and retains the greatest strength in and after induration, ought to be considered as the best.

Improved process of hardening steel.

Articles manufactured of steel for the purposes of cutting, are, almost without an exception, hardened from the anvil; in other words, they are taken from the forger to the hardener without undergoing any intermediate process; and such is the accustomed routine, that the mischief arising has escaped observation. The act of forging produces a strong scale or coating, which is spread over the whole of the blade; and to make the evil still more formidable, this scale or coating is unequal in substance, varying in proportion to the degree of heat communicated to the steel in forging; it is, partially, almost impenetrable to the action of water when immersed for the purpose of hardening. Hence it is that different degrees of hardness prevail in nearly every razor manufactured: this is evidently a positive defect; and so long as it continues to exist, great difference of temperature must exist likewise. Razor-blades not unfrequently exhibit the fact here stated in a very striking manner: what are termed clouds, or parts of unequal polish, derive their origin from this cause; and clearly and distinctly, or rather *distinctly* though not *clearly*, show how far this partial coating has extended, and where the action of the water has been yielded to, and where resisted. It certainly cannot be matter of astonishment, that so few improvements have been made in the hardening of steel, when the evil here complained of so universally obtains, as almost to warrant the supposition that no attempt has ever been made to remove it. The remedy, however, is easy and simple in the extreme, and so evidently efficient in its application, that it cannot but excite surprise, that, in the present highly improved state of our manufactures, such a communication should be made as a discovery entirely new.

Instead, therefore, of the customary mode of hardening the blade from the anvil, let it be passed immediately from the hands of the forger to the grinder; a slight application of the stone will remove the whole of the scale or coating, and the razor will then be properly prepared to undergo the operation of hardening with advantage. It will be easily ascertained, that steel in this state heats in the fire with regularity, and that when immersed, the obstacles being removed to the immediate action of the water on the body of the steel, the latter becomes equally hard from one extremity to the other. To this may be added, that, as *the lowest possible heat at which steel becomes hard is indubitably the best*, the mode here recommended will be found the only one by which the process of hardening can be effected with a less portion of fire than is, or can be, required in any other way. These observations are decisive, and will, in all probability, tend to establish in general use what cannot but be regarded as a very important improvement in the manufacturing of edged steel instruments.—*Rhodes' Essay on the Manufacture of a Razor.*

English cast steel.

The finest kind of steel, called *English cast steel,* is prepared by breaking to pieces blistered steel, and then melting it in a crucible with a flux composed of carbonaceous and vitrifiable ingredients. The vitrifiable ingredient is used inasmuch as it is a fusible body, which flows over the surface of the metal in the crucibles, and prevents the access of the oxygen of the atmosphere. Broken glass is sometimes used for this purpose.

When thoroughly fused it is cast into ingots, which, by gentle heating and careful hammering, are tilted into bars. By this process the steel becomes more highly carbonized in proportion to the quantity of flux, and in consequence is more brittle and fusible than before. Hence it surpasses all other steel in uniformity of texture, hardness, and closeness of grain, and is the material employed in all the finest articles of English cutlery.

To make edge-tools from cast steel and iron.

This method consists in fixing a clean piece of wrought iron, brought to a welding heat, in the centre of a mould, and then pouring in melted steel, so as entirely to envelope the iron; and then forging the mass into the shape required.

To colour steel blue.

The steel must be finely polished on its surface, and then exposed to an uniform degree of heat. Accordingly, there are three ways of colouring: first, by a flame producing no soot, as spirit of wine; secondly, by a hot plate of iron; and thirdly, by wood-ashes. As a very regular degree of heat is necessary, wood-ashes for fine work bears the preference. The work must be covered over with them, and carefully watched; when the colour is sufficiently heightened, the work is perfect. The colour is occasionally taken off with a very dilute marine acid.

To distinguish steel from iron.

The principal characters by which steel may be distinguished from iron, are as follows:—

1. After being polished, steel appears of a whiter, light grey hue, without the blue cast exhibited by iron. It also takes a higher polish.
2. The hardest steel when not annealed, appears granulated, but dull, and without shining fibres.
3. When steeped in acids the harder the steel is, of a darker hue is its surface.
4. Steel is not so much inclined to rust as iron.
5. In general, steel has a greater specific gravity.
6. By being hardened and wrought, it may be rendered much more elastic than iron.
7. It is not attracted so strongly by the magnet as soft iron. It likewise acquires magnetic properties more slowly, but retains them longer; for which reason, steel is used in making needles for compasses and artificial magnets.
8. Steel is ignited sooner, and fuses with less degree of heat, than malleable iron, which can scarcely be made to fuse without the addition of powdered charcoal; by which it is converted into steel, and afterwards into crude iron.
9. Polished steel is sooner tinged by heat, and that with higher colours than iron.
10. In a calcining heat, it suffers less loss by burning, than soft iron does in the same heat, and the same time. In calcination a light blue flame hovers over the steel, either with or without a sulphureous odour.
11. The scales of steel are harder and sharper than those of iron; and consequently more fit for polishing with.
12. In a white heat, when exposed to the blast of the bellows among the coals, it begins to sweat, wet, or melt, partly with light-coloured and bright, and partly with red sparkles, but less crackling than those of iron. In a melting heat too, it consumes faster.
13. In the vitriolic, nitrous, and other acids, steel is violently attacked, but is longer in dissolving than iron. After maceration, according as it is softer or harder, it appears of a lighter, or darker grey colour; while iron on the other hand is white.

VARNISHES.

To give a drying property to poppy oil.

Into 3 lbs. of pure water, put 1 oz. of sulphate of zinc, (white vitriol) and mix the whole with 2 pounds of oil of pinks, or poppy oil. Expose this mixture in an earthen vessel capable of standing the fire, to a degree of heat sufficient to maintain it in a slight state of ebullition. When one half or two thirds of the water has evaporated, pour the whole into a large glass bottle or jar, and leave it at rest till the oil becomes clear. Decant the clearest part by means of a glass funnel, the beak of which is stopped with a piece of cork: when the separation of the oil from the water is completely effected, remove the cork stopper, and supply its place by the fore-finger, which must be applied in such a manner as to suffer the water to escape, and to retain only the oil.

Poppy-oil when prepared in this manner becomes, after some weeks exceedingly limpid and colourless.

To give a drying quality to fat oils.

Take of nut-oil, or linseed-oil, 8 lbs. white lead, slightly calcined, yellow acetate of lead, (sal saturni) also calcined, sulphate of zinc, (white vitriol) each 1 oz. vitreous oxide of lead, (litharge) 12 oz. a head of garlic, or a small onion.

When the dry substances are pulverized, mix them with the garlic and oil, over a fire capable of maintaining the oil in a slight state of ebullition: continue it till the oil ceases to throw up scum, till it assumes a reddish colour, and till the head of garlic becomes brown. A pellicle will then be soon formed on the oil, which indicates that the operation is completed. Take the vessel from the fire, and the pellicle, being precipitated by rest, will carry with it all the unctuous parts which rendered the oil fat. When the oil becomes clear, separate it from the deposit, and put it into wide-mouthed bottles, where it will completely clarify itself in time, and improve in quality.

Another method.

Take of vitreous oxide of lead, (litharge) 1 1-2 oz. sulphate of zinc, (white vitriol) 3-8 of an oz. or 3 gros. linseed, or nut-oil, 16 oz. The operation must be conducted as in the preceding case.

The choice of the oil is not a matter of indifference. If it be destined for painting articles exposed to the impression of the external air, or for delicate painting, nut-oil or poppy-oil will be requisite. Linseed oil is used for coarse painting, and that sheltered from the effects of the rain and of the sun.

A little negligence in the management of the fire, has often an influence on the colour of the oil, to which a drying quality is communicated; in this case it is not proper for delicate painting. This inconvenience may be avoided by tying up the drying matters in a small bag; but the dose of the litharge must then be doubled. The bag must be suspended by a piece of packthread fastened to a stick, which is made to rest on the edge of the vessel in such a manner as to keep the bag at the distance of an inch from the bottom of the vessel. A pellicle will be formed as in the first operation, but it will be slower in making its appearance.

Another.

A drying quality may be communicated to oil by treating, in a heat capable of maintaining a slight ebullition, linseed or nut-oil, to each pound of which is added 3 oz. of vitreous oxide of lead, (litharge) reduced to fine powder.

The preparation of floor-cloths, and all paintings of large figures or ornaments, in which argillaceous colours, such as yellow and red boles, Dutch pink, &c. are employed, require this kind of preparation, that the desiccation may not be too slow; but painting for which metallic oxides are used, such as preparations of lead, copper, &c. require only the doses before indicated, because these oxides contain a great deal of oxygen, and the oil, by their contact, acquires more of a drying quality.

Another.

Take of nut-oil, 2 lbs. common water, 3 do. sulphate of zinc, (white vitriol) 2 oz.

Mix these matters, and subject them to a slight ebullition, till little water remains. Decant the oil which will pass over with a small quantity of water, and separate the latter by means of a funnel. The oil remains nebulous for some time: after which it becomes clear, and seems to be very little coloured.

Another.

Take of nut oil, or linseed oil, 6 lbs. common water, 4 lbs. sulphate of zinc, 1 oz. garlic, one head.

Mix these matters in a large iron or copper pan; then place them over the fire, and maintain the mixture in a state of ebullition during the whole day; boiling water must from time to time be added, to make up for the loss of that by evaporation. The garlic will assume a brown appearance. Take the pan from the fire, and having suffered a deposit to be formed, decant the oil, which will clarify itself in the vessels. By this process the drying oil is rendered somewhat more coloured: it is reserved for delicate colours.

Resinous drying oil.

Take 10 lbs. of drying nut oil, if the paint is destined for external articles, or 10 lbs. of drying linseed oil, if for internal, resin, 3 lbs. turpentine, 6 oz.

Cause the resin to dissolve the oil by means of a gentle heat. When dissolved and incorporated with the oil, add the turpentine: leave the varnish at rest, by which means it will often deposit portions of resin and other impurities; and then preserve it in wide-mouthed bottles. It must be used fresh; when suffered to grow old it abandons some of its resin. If this resinous oil assumes too much consistence, dilute it with a little essence, if intended for articles sheltered from the sun, or with oil of poppies.

In Switzerland, where the principal part of the mason's work consists of stone subject to crumble to pieces, it is often found necessary to give them a coating of oil paints to stop the effects of this decomposition. This painting has a great deal of lustre, and when the last coating is applied with resinous oil, it has the effect of a varnish. To give it more durability, the first ought to be applied exceedingly warm and with plain oil, or oil very little charged, with the grey colour, which is added to the two following.—

Fat copal varnish.

Take picked copal, 16 ounces, prepared linseed oil, or oil of poppes, 8 do. essence of turpentine, 16 do.

Liquefy the copal in a matrass over a common fire, and then add the linseed oil, or oil of poppies, in a state of ebullition; when these matters are incorporated, take the matrass from the fire, stir the matter till the greatest heat is subsided, and then add the essence of turpentine warm. Strain the whole, while still warm, through a piece of linen, and put the varnish into a wide mouthed bottle. Time contributes towards its clarification; and in this manner it acquires a better quality.

Varnish for watch cases, in imitation of tortoise shell.

Take copal of an amber colour, 6 oz. Venice turpentine, 1 1-2 oz. prepared linseed oil, 24 oz. essence of turpentine, 6 oz.

It is customary to place the turpentine over the copal, reduced to small fragments, in the bottom of an earthen or metal vessel, or in a matrass exposed to such a heat as to liquefy the copal: but it is more advantageous to liquefy the latter alone, to add the oil in a state of ebulition, then the turpentine liquefied, and in the last place, the essence. If the varnish is too thick, some essence may be added. The latter liquor is a regulator for the consistence in the hands of an artist.

To make a colourless copal varnish.

As all copal is not fit for this purpose, in order to ascertain such pieces as are good, each must be taken separately, and a single drop of pure essential oil of rosemary, not altered by keeping, must be let fall on it. Those pieces which soften at the part that imbibes the oil, are good; reduce them to powder, which sift through a very fine hair sieve, and put it into a glass, on the bottom of which it must not lie more than a finger's breadth thick. Pour upon it essence of rosemary to a similar height; stir the whole for a few minutes, when the copal will dissolve into a viscous fluid. Let it stand for two hours, and then pour gently on it two or three drops of very pure alcohol, which distribute over the oily mass, by inclining the bottle in different directions with a very gentle motion. Repeat this operation by little and little, till the incorporation is effected, and the varnish reduced to a proper degree of fluidity. It must then be left to stand a few days, and when very clear be decanted off. This varnish, thus made without heat, may be applied with equal success to pasteboard, wood, and metals, and takes a better polish than any other. It may be used on paintings, the beauty of which it greatly heightens.—*Monthly Mag. Oct.* 1809.

Gold-coloured copal varnish.

Take copal in powder, 1 ounce, essential oil of lavender, 2 do. essence of turpentine, 6 do.

Put the essential oil of lavender into a matrass of a proper size, placed on a sand-bath heated by an Argand's lamp, or over a moderated coal fire. Add to the oil while very warm, and at several times, the copal powder, and stir the mixture with a stick of white wood rounded at the end. When the copal has entirely disappeared, add at three different times the essence almost in a state of ebullition, and keep continually stirring the mixture. When the solution is completed, the result will be a varnish of a gold colour, exceedingly durable and brilliant, but less drying than the preceding.

Another method.

To obtain this varnish colourless, it will be proper to rectify the essence of the shops, which is often highly coloured, and to give it the necessary density by exposure to the sun in bottles closed with cork stoppers, leaving an interval of some inches between the stopper and the surface of the liquid. A few months are thus sufficient to communicate to it the required qualities. Besides, the essence of the shops is rarely possessed of that state of consistence, without having at the same time a strong amber colour.

The varnish resulting from the solution of copal in oil of turpentine, brought to such a state as to produce the maximum of solution, is exceedingly durable and brilliant. It resists the shock of hard bodies much better than the enamel of toys, which often becomes scratched and whitened by the impression of repeated friction; it is susceptible also of a fine polish. It is applied with the greatest success to philosophical instruments, and the paintings with which vessels and other utensils of metal are decorated.

Another.

Take copal, 4 ounces, clear turpentine, 1 oz.

Put the copal, coarsely pulverized, into a varnish pot, and give it the form of a pyramid, which must be covered with turpentine. Shut the vessel closely, and placing it over a gentle fire, increase the heat gradually that it may not attack the copal; as soon as the matter is well liquefied, pour it upon a plate of copper, and when it has resumed its consistence reduce it to powder.

Put half an ounce of this powder into a matrass with four ounces of the essence of turpentine, and stir the mixture till the solid matter is entirely dissolved.—*Journal de Physique.*

Camphorated copal varnish.

This varnish is destined for articles which require durability, pliableness, and transparency, such as the varnished wire-gauze, used in ships instead of glass.

Take of pulverized copal, 2 oz. essential oil of lavender, 6 do. camphor, 1-8th of an oz. essence of turpentine, a sufficient quantity, according to the consistence required to be given to the varnish.

Put into a phial of thin glass, or into a small matrass, the essential oil of lavender and the camphor; and place the mixture on a moderately open fire, to bring the oil and the camphor to a slight state of ebullition; then add the copal powder in small portions, which must be renewed as they disappear in the liquid. Favour the solution, by continually stirring it with a stick of white wood; and when the copal is incorporated with the oil, add the essence of turpentine boiling; but care must be taken to pour in, at first, only a small portion.

This varnish is little coloured, and by rest it acquires a transparency which, united to the solidity observed in almost every kind of copal varnishes, renders it fit to be applied with great success in many cases, and particularly in the ingenious invention of substituting varnished metallic gauze in the room of Muscovy talc, a kind of mica, in large laminæ, used for the cabin windows of ships, as presenting more resistance to the concussion of the air during the firing of the guns. Varnished metallic gauze, of this kind, is manufactured at Rouen.

Ethereal copal varnish.

Take of amberry copal, 1-2 ounce, ether 2 ditto.

Reduce the copal to a very fine powder, and introduce it by small portions into the flask which contains the ether; close the flask with a glass or a cork stopper, and having shaken the mixture for half an hour, leave it at rest till the next morning. In shaking the flask, if the sides become covered with small undulations, and if the liquor be not exceedingly clear, the solution is not complete. In this case, add a little ether, and leave the mixture at rest. The varnish is of a light lemon colour. The largest quantity of copal united to ether may be a fourth, and the least a fifth. The use of copal varnish made with ether seems, by the expense attending it, to be confined to repairing those accidents which frequently happen to the enamel of toys, as it will supply the place of glass to the coloured varnishes employed for mending fractures, or to restoring the smooth surface of paintings which have been cracked and shattered.

The great volatility of ether, and in particular its high price, do not allow the application of this varnish to be recommended, but for the purpose here indicated. It has been applied to wood with complete success, and the glazing it produced united lustre to solidity. In consequence of the too speedy evaporation of the liquid, it often boils under the brush. Its evaporation, however may be retarded, by spreading over the wood a slight stratum of essential oil of rosemary, or lavender, or even of turpentine, which may afterwards be removed by a piece of linen rag; what remains is sufficient to retard the evaporation of the ether.

Turpentine copal varnish.

Take of copal, of an amber colour, and in powder, 1 1-2 ounce, best oil of turpentine, 8 ditto.

Expose the essence to a balneum mariæ, in a wide-mouthed matrass with a short neck; as soon as the water of the bath begins to boil, throw into the essence a large pinch of copal powder, and keep the matrass in a state of circular motion. When the powder is incorporated with the essence, add new doses of it; and continue in this manner till you observe that there is formed an insoluble deposit. Then take the matrass from the bath, and leave it at rest for some days. Draw off the clear varnish, and filter it through cotton.

At the moment when the first portion of the copal is thrown into the essence, if the powder precipitate itself under the form of lumps, it is needless to proceed any further. This effect arises from two causes: either the essence does not possess the proper degree of concentration, or it has not been sufficiently deprived of water. Exposure to the sun, ememploying the same matrasss, to which a cork stopper ought to be added, will give it the qualities requisite for the solution of the copal. This effect will be announced by the disappearance of the portion of copal already put into it.

Another copal varnish.

Take of copal, liquefied, 3 oz. essence of turpentine, 20 do.

Place the matrass containing the oil in a balneum mariæ, and when the water boils add the pulverized copal in small doses. Keep stirring the mixture and add no more copal till the former be incorporated with the oil. If the oil, in consequence of its particular disposition, can take up 3 ounces of it, add a little more; but stop if the liquid becomes nebulous; then leave the varnish at rest. If it be too thick, dilute it with a little warm essence, after having heated it in the balneum mariæ. When cold, filter it through cotton, and preserve it in a clean bottle.

This varnish has a good consistence, and is as free from colour as the best alcoholic varnish. When extended in one stratum over smooth wood, which has undergone no preparation, it forms a very brilliant glazing, which, in the course of two days, in summer, acquires all the solidity that may be required.

The facility which attends the preparation of this varnish by the new method here indicated, will admit of its being applied to all coloured grounds which require solidity, pure whites alone excepted; painted boxes, therefore, and all small articles, coloured or not coloured, where it is required to make the veins appear in all the richness of their tones, call for the application of this varnish, which produces the most beautiful effect, and which is more durable than turpentine varnishes composed with other resinous substances.

Fat amber varnish.

Take of amber coarsely powdered, 16 oz. Venice turpentine, or gum lac, 2 do. prepared linseed oil, 10 do. essence of turpentine, 15 or 16 do.

The circumstances of the process are the same as those prescribed for the preparation of the camphorated copal varnish.

This varnish was formerly much used; but it has given place, in part, to that of copal, which is preferred on account of its being less coloured. Watin introduces more essence and less linseed oil; experience and long practice are the only authority on which I recommend the adoption of the present formula.

Amber varnish with essence of turpentine.

Take of amber liquefied, and separated from the oily portions, which alter its consistence, 6 or 7 oz.

Reduce the amber to powder, and if the operation of pounding forms it into a paste, break it with your fingers: then mix it with the essence, and heat the whole in a balneum mariæ. It will speedily dissolve, and the essence will take up, at the least, a fourth part of its weight of the prepared amber.

When one coating of it is applied to white smooth wood, but without any preparation, it forms a very pure and very durable glazing, which speedily dries, but slower than copal varnish.

Fat amber or copal varnish.

Take of amber or copal of one fusion 4 oz. essence of turpentine, drying linseed oil of each 10 oz.

Put the whole into a pretty large matrass, and expose it to the heat of a balneum mariæ, or move it over the surface of an uncovered chafing-dish, but without flame, and at the distance from it of two or three inches. When the solution is completed, add still a little copal or amber to saturate the liquid; then pour the whole on a filter prepared with cotton, and leave it to clarify by rest. If the varnish is is too thick, add a little warm essence to prevent the separation of any of the amber.

This varnish is coloured, but far less so than those composed by the usual methods. When spread over white wood, without any preparation, it forms a solid glazing, and communicates a slight tint to the wood.

If it is required to charge this varnish with more copal, or prepared amber, the liquid must be composed of two parts of essence for one of oil.

Compound mastic varnish.

Take of pure alcohol, 32 oz. purified mastic, 6 oz. gum sandarac, 3 oz. very clear Venice turpentine, 3 oz. glass, coarsely pounded, 4 oz.

Reduce the mastic and sandarac to fine powder; mix this powder with white glass, from which the finest parts have been separated by means of a hair sieve; put all the ingredients with alcohol into a short-necked matrass, and adapt to it a stick of white wood, rounded at the end, and of a length proportioned to the height of the matrass, that it may be put in motion. Expose the matrass in a vessel filled with water, made at first a little warm, and which must afterwards be maintained in a state of ebullition for one or two hours. The matrass may be made fast to a ring of straw.

When the solution seems to be sufficiently extended, add the turpentine which must be kept separately in a phial or a pot, and which must be melted, by immersing it for a moment in a balneum mariæ. The matrass must be still left in the water for half an hour, at the end of which it is taken off; and the varnish is continually stirred till it is somewhat cool. Next day it is to be drawn off, and filtered through cotton. By these means it will become exceedingly limpid.

The addition of glass may appear extraordinary; but this substance divides the parts of the mixture, which have been made with the dry ingredients, and it retains the same quality when placed over the fire. It therefore obviates with success two inconveniences, which are exceedingly troublesome to those who compose varnishes. In the first place, by dividing the matters, it facilitates the action of the alcohol; and in the second its weight, which surpasses that of resins, prevents these resins from adhering to the bottom of the bottom of the matrass, and also the coloration acquired by the varnish, when a sand-bath is employed as is commonly the case.

The application of this varnish is suited to articles belonging to the toilette, such as dressing-boxes, cut paper-works, &c. The following possess the same brilliancy and lustre; but they have more solidity, and are exceedingly drying.

Camphorated mastic varnish for paintings.

Take of mastic, cleaned and washed, 12 ounces, pure turpentine, 1 1-2 oz. camphor, 1-2 oz. white glass, pounded, 5 oz. etherous essence of turpentine, 36 oz.

Make the varnish according to the method indicated for Compound Mastic Varnish of the first genus. The camphor is employed in pieces, and the turpentine is added when the solution of the resin is completed. But if the varnish is to be applied to old paintings, or paintings which have been already varnished, the turpentine may be suppressed, as this ingredient is here recommended only in cases of a first application to new paintings, and just freed from white of egg varnish.

The etherous essence recommended for varnish, is that distilled slowly without any intermediate substance, according to the second process already given for its rectification.

The question by able masters, respecting the kind of varnish proper to be employed for paintings, has never yet been determined.

Some artists, who have paid particular attention to this object, make a mystery of the means they employ to obtain the desired effect. The real end may be accomplished by giving to the varnish, destined for painting, pliability and softness, without being too solicitous in regard to what may add to its con sistence or its solidity. The latter quality is particularly requisite in varnishes which are to be applied to articles much exposed to friction, such as boxes, furniture, &c.

To make painters' cream.

Painters, who have long intervals between their periods of labour, are accustomed to cover the parts they have painted with a preparation which preserves the freshness of the colours, and which they can remove when they resume their work. This preparation is as follows:

Take of very clear nut oil, 3 ounces, mastic in tears, pulverized, 1-2 oz. sal saturni, in powder (acetate of lead,) 1-3 of an ounce.

Dissolve the mastic in oil, over a gentle fire, and pour the mixture into a marble mortar, over the pounded salt of lead; stir it with a wooden pestle, and add water in small quantities, till the matter assume the appearance and consistence of cream, and refuse to admit more water.

Sandarac varnish.

Take of gum sandarac, 8 oz. pounded mastic, 2 oz. clear turpentine, 4 oz. pounded glass, 4 oz. alcohol, 32 oz. Mix and dissolve as before.

Compound sandarac varnish.

Take of pounded copal of an amber colour, once liquified, 3 oz. gum sandarac, 6 oz. mastic, cleaned, 3 oz. clear turpentine, 2 1-2 oz. pounded glass, 4oz. pure alcohol, 32 oz. Mix these ingredients, and pursue the same method as above.

This varnish is destined for articles subject to friction, such as furniture, chairs, fan-sticks, mouldings, &c. and even metals; to which it may be applied with success. The sandarac gives it great durability.

Camphorated sandarac varnish for cut-paper works, dressing-boxes, &c.

Take of gum sandarac, 6 oz. gum elemi, 4 oz. gum animi, 1 oz. camphor, 1-2 oz. pounded glass, 4 oz. pure alcohol, 32 oz.

Make the varnish according to the directions already given. The soft resins must be pounded with the dry bodies. The camphor is to be added in pieces.

Another.

Take of gallipot, or white incense, 6 oz. gum animi, gum elemi, each 2 oz. pounded glass, 4 oz. alcohol, 32 oz.

Make the varnish with the precautions indicated for the compound mastic varnish.

The two last varnishes are to be used for ceilings and wainscots, coloured or not coloured: they may even be employed as a covering to parts painted with strong colours.

Spiritous sandarac varnish for wainscotting small articles of furniture, balastrades, and inside railing.

Take gum sandarac, 6 oz. shell lac, 2 oz. colophonium, or resin, white glass pounded, clear turpentine, each 4 oz. pure alcohol, 32 oz.

Dissolve the varnish according to the directions given for compound mastic varnish.

This varnish is sufficiently durable to be applied to articles destined to daily and continual use. Varnishes composed with copal ought, however, in these cases to be preferred.

Another.

There is another composition which, without forming part of the compound varnishes, is employed with success for giving a polish and lustre to furniture made of wood: wax forms the basis of it.

Many cabinet-makers are contented with waxing common furniture, such as tables, chests of draws, &c. this covering, by means of repeated friction, soon acquires a polish and transparency which resemble those of varnish. Waxing seems to possess qualities peculiar to itself; but like varnish, it is attended with inconveniences as well advantages.

Varnish supplies better the part of glazing; it gives a lustre to the wood which it covers, and heightens the colours of that destined, in particular, for delicate articles. These real and valuable advantages are counterbalanced by its want of consistence: it yields too easily to the shrinking or swelling of the wood, and rises in scales or splits, on being exposed to the slightest shock. These accidents can be repaired only by new strata of varnish, which render application to the varnisher necessary, and occasion trouble and expense.

Waxing stands shocks; but it does not possess, in the same degree as varnish, the property of giving lustre to the bodies on which it is applied, and of heightening their tints. The lustre it communicates is dull, but this inconvenience is compensated by the facility with which any accident that may have altered its polish can be repaired, by rubbing it with a piece of fine cork. There are some circumstances, therefore, under which the application of wax ought to be preferred to that of varnish. This seems to be the case in particular with tables of walnut-tree wood, exposed to daily use, chairs, mouldings, and for all small articles subject to constant employment.

But as it is of importance to make the stratum of wax as thin as possible in order that the veins of the wood may be more apparent, the following process will be acceptable to the reader.

Melt over a moderate fire, in a very clean vessel, two ounces of white or yellow wax; and when liquified, add four ounces of good essence of turpentine. Stir the whole until it is entirely cool, and the result will be a kind of pomade fit for waxing furniture, and which must be rubbed over them according to the usual method. The essence of turpentine is soon dissipated; but the wax, which by its mixture is reduced to a state of very great division, may be extended with more ease, and in a more uniform manner. The essence soon penetrates the pores of the wood, calls forth the colour of it, causes the wax to adhere better, and the lustre which thence results is equal to that of varnish, without having any of its inconveniences.

Coloured varnish for violins, & other stringed instruments, also for plum tree, mahogany and rose-wood.

Take gum sandarac, 4 oz. seed lac, 2 oz. mastic, Benjamin in tears, each 1 oz. pounded glass, 4 oz. Venice turpentine, 2 oz. pure alcohol, 32 oz.

The gum sandarac and lac render this varnish durable: it may be coloured with a little saffron or dragon's blood.

Fat varnish of a gold colour.

Take amber, 8 oz. gum lac, 2 oz. drying linseed oil, 8 oz. essence of turpentine, 16 oz.

Dissolve separately the gum lac, and then add the amber prepared and pulverized, with the linseed oil and essence very warm. When the whole has lost a part of its heat, mix in relative proportions, tinctures of annatto, of terra merita, gum guttæ, and dragon's blood. This varnish, when applied to white metals, gives them a gold colour.

Fat turpentine or golden varnish, being a mordant to gold and dark colours.

Take boiled linseed oil, 16 oz. Venice turpentine, 8 oz. Naples yellow, 5 oz.

Heat the oil with the turpentine; and mix the Naples yellow pulverized.

Naples yellow is an oxide of lead, the composition of which will be given when we come to treat of colouring substances. It is substituted here for resins, on account of its drying qualities, and in particular of its colour, which resembles that of gold; great use is made of the varnish in applying gold leaf.

The yellow, however, may be omitted when this species of varnish is to be solid and coloured coverings. In this case an ounce of litharge to each pound of composition may be substituted in its stead, without this mixture doing any injury to the colour which is to constitute the ground, (*la teinte dure.*)

To make turner's varnish for boxwood.

Take seed lac, 5 oz. gum sandarac, 2 oz. gum elemi, 1 1-2 oz. Venice turpentine, 2 oz. pounded glass, 5 oz. pure alcohol, 24 oz.

The artists of St. Claude do not all employ this formula, which requires to be corrected on account of its too great dryness, which is here lessened by the turpentine and gum elemi. This composition is secured from cracking, which disfigures these boxes after they have been used for some months.

Another.

Other turners employ the gum lac united to a little elemi and turpentine digested some months in pure alcohol exposed to the sun. If this method be followed, it will be proper to substitute for the sandarac, the same quantity of gum lac reduced to powder, and not to add the turpentine to the alcohol, which ought to be exceedingly pure, till towards the end of the infusion.

Solar infusion requires care and attention. Vessels of a sufficient size to allow the spiritous vapours to circulate freely ought to be employed, because it is necessary that the vessels should be closely shut. Without this precaution the spirits would become weakened, and abandon the resin which they laid hold of during the first days of exposure. This perfect obituration will not admit of the vessels being too full.

In general the varnishes applied to articles which may be put into the lathe acquire a great deal of brilliancy by polishing, a piece of woollen cloth is sufficient for the operation. If turpentine predominates too much in these compositions the polish does not retain its lustre, because the heat of the hands is capable of softening the surface of the varnish, and in this state it readily tarnishes.

To varnish dressing-boxes.

The most of spirit of wine varnishes are destined for covering preliminary preparations, which have a certain degree of lustre. They consist of cement, coloured or not coloured, charged with landscapes and figures cut out in paper, which produces an effect under the transparent varnish; most of the dressing-boxes, and other small articles of the same kind, are covered with this particular composition, which, in general, consists of three or four coatings of Spanish white pounded in water, and mixed up with parchment glue. The first coating is smoothed with pumice-stone, and then polished with a piece of new linen and water. The coating in this state is fit to receive the destined colour, after it has been ground with water, and mixed with parchment glue diluted with water. The cut figures with which it is to be embellished, are then applied, and a coating of gum, or fish-glue is spread over them, to prevent the varnish from penetrating to the preparation, and from spoiling the figures. The operation is finished by applying three or four coatings of varnish, which, when dry, are polished with tripoli and water, by means of a piece of cloth. A lustre is then given to the surface with starch and a bit of doe-skin, or very soft cloth.

Gallipot varnish.

Take of gallipot, or white incense, 12 oz. white glass, pounded, 5 oz. Venice turpentine, 2 oz. essence of turpentine, 32 oz. Make the varnish after the white incense has been pounded with the glass.

Some authors recommend mastic or sandarac in the room of gallipot; but the varnish is neither more beautiful nor more durable. When the colour is ground with the preceding varnish, and mixed up with the latter, which, if too thick, is thinned with a little essence, and which is applied immediately, and without any sizing, to boxes and other articles, the coatings acquire sufficient strength to resist the blows of a mallet. But if the varnish be applied to a sized colour, it must be covered with a varnish of the first or second genus.

Mastic gallipot-varnish, for grinding colours.

Take of new gallipot, or white incense, 4 ounces, mastic, 2 oz. Venice turpentine, 6 oz. pounded glass, 4 oz. essence of turpentine, 32 ounces.

When the varnish is made with the precautions already indicated, add prepared nut oil or linseed oil, two ounces.

The matters ground with this varnish dry more slowly; they are then mixed up with the following varnish, if it be for common painting, or with particular varnishes destined for colours and for grounds.

Lacquer for brass.

Take of seed lac, 6 oz. amber or copal, ground on porphyry, 2 oz. dragon's blood, 40 grains, extract of red sandal wood, obtained by water, 30 grains, oriental saffron, 36 grains, pounded glass, 4 oz. very pure alcohol, 40 oz.

To apply this varnish to articles or ornaments of brass, expose them to a gentle heat, and dip them into varnish. Two or three coatings may be applied in this manner, if necessary. The varnish is durable, and has a beautiful colour. Articles varnished in this manner, may be cleaned with water and a bit of dry rag.

Lacquer for philosophical instruments.

This lacquer or varnish is destined to change, or to modify the colour of those bodies to which it is applied.

Take of gum guttæ, 3-4 oz. gum sandarac, gum elemi, each 2 oz. dragon's blood, of the best quality, 1 oz. seed lac, 1 oz. terra merita, 3-4 oz. oriental saffron, 2 gr. pounded glass, 3 oz. pure alcohol, 20 oz.

The tincture of saffron and of terra merita, is first obtained by infusing them in alcohol for twenty-four hours, or exposing them to the heat of the sun in summer. The tincture must be strained through a piece of clean linen cloth, and ought to be strongly squeezed. This tincture is poured over the dragon's blood, the gum elemi, the seed lac, and the gum guttæ, all pounded and mixed with the glass. The varnish is then made according to the directions before given.

It may be applied with great advantage to philosophical instruments: the use of it might be extended also to various cast or moulded articles with which furniture is ornamented.

If the dragon's blood be of the first quality, it may give too high a colour; in this case the dose may be lessened at pleasure, as well as that of the other colouring matters.

It is with a similar kind of varnish that the artists of Geneva give a golden orange colour to the small nails employed to ornament watch cases; but they keep the process very secret. A beautiful bright colour might be easily communicated to this mixture; but they prefer the orange colour produced by certain compositions, the preparation of which has no relation to that of varnish, and which has been successfully imitated with saline mixtures, in which orpiment is a principal ingredient. The nails are heated before they are immersed in the varnish, and they are then spread out on sheets of dry paper.

Gold-coloured lacquer for brass watch cases, watch-keys, &c.

Take of seed lac, 6 oz. amber, gum guttæ, each 2 oz. extract of red sandal wood in water, 24 grains, dragon's blood, 60 grains, oriental saffron, 36 grains, pounded glass, 4 oz. pure alcohol, 36 ounces.

Grind the amber, the seed lac, gum guttæ, and dragon's blood on a piece of porphyry; then mix them with the pounded glass, and add the alcohol, after forming with it an infusion of the saffron and an extract of the sandal wood. The varnish must then be completed as before. The metal articles destined to be covered by this varnish are heated, and those which will admit of it, are immersed in packets. The tint of the varnish may be varied by modifying the doses of the colouring substances.

Lacquer of a less drying quality.

Take of seed lac, 4 oz. sandarac, or mastic, 4 oz. dragon's blood, 1-2 oz. terra merita, gum guttæ, each 36 grains, pounded glass, 5 oz. clear turpentine, 2 oz. essence of turpentine, 32 ounces.

Extract by infusion the tincture of the colouring substances, and then add the resinous bodies according to the directions for compound mastic varnish.

Lacquer or varnishes of this kind are called changing, because, when applied to metals, such as copper, brass, or hammered tin, or to wooden boxes and other furniture, they communicate to them a more agreeable colour. Besides, by their contact with the common metals, they acquire a lustre which approaches that of the precious metals, and to which, in consequence of peculiar intrinsic qualities or certain laws of convention, a much greater value is attached. It is by means of these changing varnishes, that artists are able to communicate to their leaves of silver and copper, those shining colours observed in foils. This product of industry becomes a source of prosperity to the manufacturers of buttons and works formed with foil, which in the hands of the jeweller contributes with so much success to produce that reflection of the rays of light which doubles the lustre and sparkling quality of precious stones.

It is to varnish of this kind that we are indebted for the manufactory of gilt leather, which, taking refuge in England, has given place to that of papier machee, which is employed for the decoration of palaces, theatres, &c.

In the last place, it is by the effect of a foreign tint, obtained from the colouring part of saffron, that the scales of silver disseminated in *confection d'hyacinthe* reflect a beautiful gold colour.

The colours transmitted by different colouring substances, require tones suited to the objects for which they are destined. The artist has it in his own power to vary them at pleasure, by the addition of annatto to the mixture of dragon's blood, saffron, &c. or some changes in the doses of the mode intended to be made in colours. It is, therefore, impossible to give limited formulæ.

To make lacquers of various tints.

There is one simple method by which artists may be enabled to obtain all the different tints they require. Infuse separately 4 ounces of gum guttæ in 32 ounces of essence of turpentine, and 4 ounces of dragon's blood, and an ounce of annatto also in separate doses of essence. These infusions may be easily made in the sun. After fifteen days' exposure pour a certain quantity of these liquors into a flask, and by varying the doses different shades of colour will be obtained.

These infusions may be employed also for changing alcoholic varnishes; but in this case the use of saffron, as well as that of red sandal wood, which does not succeed with essence, will soon give the tone necessary for imitating with other tinctures the colour of gold.

Mordant varnish for gilding.

Take of mastic, 1 ounce, gum sandarac, 1 do. gum guttæ, 1-2 do. turpentine, 1-4th do. essence of turpentine, 6 do.

Some artists who make use of mordants, substitute for the turpentine an ounce of the essence of lavender, which renders this composition still less drying.

In general, the composition of mordants admits of modifications, according to the kind of work for which they are destined. The application of them, however, is confined chiefly to gold. When it is required to fill up a design with gold leaf on any ground whatever, the composition which is to serve as the means of union between the metal and the ground, ought to be neither too thick nor too fluid; because both these circumstances are equally injurious to delicacy in the strokes; it will be requisite also that the composition should not dry till the artist has completed his design.

Other mordants.

Some prepare their mordants with Jew's pitch and drying oil diluted with essence of turpentine. They employ it for gilding pale gold, or for bronzing.

Other artists imitate the Chinese, and mix with their mordants colours proper for assisting the tone which they are desirous of giving to the gold, such as yellow, red, &c.

Others employing merely fat varnish, to which they add a little red oxide of lead (minium.)

Others make use of thick glue, in which they dissolve a little honey. This is what they call *batture*. When they are desirous of heightening the colour of the gold, they employ this glue, to which the gold leaf adheres exceedingly well.

Another.

The qualities of the following are fit for every kind of application, and particularly to metals. Expose boiled oil to a strong heat in a pan; when a black smoke is disengaged from it, set it on fire, and extinguish it a few moments after by putting on the cover of the pan. Then pour the matter still warm into a heated bottle, and add to it a little essence of turpentine. This mordant dries very speedily: it has body and adheres to, and strongly retains gold leaf, when applied to wood, metals, and other substances.

To prepare a composition for making coloured drawings and prints resemble paintings in oil.

Take of Canada balsam, 1 ounce, spirit of turpentine, 2 ounces: mix them together. Before this composition is applied, the drawing or print should be sized with a solution of isinglass in water, and when dry, apply the varnish with a camel hair brush.

A varnish to colour baskets.

Take either red, black, or white sealing wax, which ever colour you wish to make: to every 2 ounces of sealing wax, add 1 ounce of spirit of wine: pound the wax fine, then sift it through a fine lawn sieve, till you have made it extremely fine; put it into a large phial with the spirit of wine, shake it, let it stand near the fire 48 hours, shaking it often; then, with a little, brush the baskets all over with it; let them dry, and do them over a second time.

To prepare anti-attrition.

According to the specification of the patent, this mixture consists of one hundred weight of plumbago, to four hundred of hog's lard, or other grease; the two to be well incorporated. The application is to prevent the effects of friction in all descriptions of engines or machines; and a sufficient quantity must be rubbed over the surface of the axle, spindle, or other part where the bearing is.

Varnish for pales and coarse wood work.

Take any quantity of tar, and grind it with as much Spanish brown as it will bear, without rendering it too thick to be used as a paint or varnish, and then spread it on the pales, or other wood, as soon as convenient, for it quickly hardens by keeping.

This mixture must be laid on the wood to be varnished by a large brush, or house painter's tool; and the work should then be kept as free from dust and insects as possible, till the varnish be thoroughly dry. It will, if laid on smooth wood, have a very good gloss, and is an excellent preservative of it against moisture; on which account, as well as its being cheaper, it is far preferable to painting, not only for pales, but for weather boarding, and all other kinds of wood work for grosser purposes. Where the glossy brown colour is not liked, the work may be made of a greyish brown, by mixing a small proportion of white lead, or whiting and ivory black, with the Spanish brown.

A black varnish for old straw or chip hats.

Take of best black sealing wax, 1-2 an ounce; rectified spirit of wine, 2 ounces, powder the sealing wax, and put it with the spirit of wine, into a four ounce phial; digest them in a sand heat, or near a fire, till the wax is dissolved; lay it on warm with a fine soft hair-brush, before a fire or in the sun. It gives a good stiffness to old straw hats, and a beautiful gloss, equal to new, and resists wet.

To paint sail cloth, &c. so as to be pliant, durable, and impervious to water.

This process, which is extracted from the *Transactions of the Society of Arts*, is now universally practised in the public dock-yards.

The paint usually laid upon canvass hardens to such a degree as to crack, and eventually to break the canvass, which renders it unserviceable in a short time: but the canvas painted in the new manner is so superior, that all canvas used in the navy is thus prepared; and a saving of a guinea is made in every one hundred square yards of canvas so painted.

The old mode of painting canvas, was to wet the canvas, and prime it with Spanish brown; then to give it a second coat of a chocolate colour, made by mixing Spanish brown and black paint; and, lastly, to finish it with black.

The new method is to grind 96 lbs. of English ochre with boiled oil, and to add 16 lbs. of black paint, which mixture forms an indifferent black. A pound of yellow soap dissolved in 6 pints of water over the fire, is mixed, while hot, with the paint. This composition is then laid upon the canvas (without being wetted, as in the usual way,) as stiff as can conveniently be done with the brush, so as to form a smooth surface; the next day, or still better, on the second day, a second coat of ochre and black (without any, or but a very small portion of soap) is laid on, and allowing this coat an intermediate day for drying, the canvass is then finished with black paint as usual. Three days being then allowed for it to dry and harden, it does not stick together when taken down, and folded in cloths containing 60 or 70 yards each; and canvas finished entirely with the composition, leaving it to dry one day between each coat, will not stick together, if laid in quantities.

It has been ascertained from actual trials, that the solution of yellow soap is a preservative to red, yellow, and black paints, when ground in oil and put into casks, as they acquire no improper hardness, and dry in a remarkable manner when laid on with the brush, without the use of the usual drying articles.

It is surprising that the adoption of soap, which is so well known to be miscible with oily substances, or, at least, the alkali of which it is composed, has not already been brought into use in the composition of oil colours.

Coloured composition for rendering linen and cloth impenetrable to water.

Begin by washing the stuff with hot water; then dry and rub it between the hands until such time as it becomes perfectly supple; afterwards spread it out by drawing it into a frame, and give it, with the aid of a brush, a first coat composed of a mixture of 8 quarts of boiling linseed oil, 15 *grammes* of calcined amber and acetate of lead, (of each 7 1-2 *grammes*) to which add 90 *grammes* of lamp black. For the second coat use the same ingredients as above, except the calx of lead. This coat will give a few hours, according to the season; afterwards take a dry plaisterer's brush, and rub the stuff strongly with it, when the hair, by this operation, will become very smooth. The third and last coat will give a perfect and durable jet black.

Or rather take 12 quarts of boiling linseed oil, 30 *grammes* of amber, 15 *grammes* of acetate of lead, 7 1-2 sulphate of zinc, 15 Prussian blue, and 7 1-2 verdigris; mix them very fine with a little oil, and add 120 *grammes* of lamp-black. These coats are used at discretion, as is done with painting.—*Annales de l' Indus.* 1821.

To thicken linen cloth for screens and bed testers.

Grind whiting with zinc, and to prevent its cracking, add a little honey to it; then take a soft brush, and lay it upon the cloth, and so do two or three times, suffering it the meanwhile to dry between layings on, and for the last laying, smooth it over with Spanish white, ground with linseed oil, the oil being first heated, and mixed with a small quantity of the litharge of gold, the better to endure the weather, and so it will be lasting.

Common wax, or varnished cloth.

The manufacture of this kind of cloth is very simple. The cloth and linseed oil are the principal articles required for the establishment. Common canvas of an open and coarse texture, is extended on large frames, placed under sheds, the sides of which are open, so as to afford a free passage to the external air. The manner in which the cloth is fastened to these frames is as follows: it is fixed to each side of the frame by hooks which catch the edge of the cloth, and by pieces of strong packthread, passing through holes at the other extremity of the hooks, which are tied round moveable pegs placed in the lower edge of the frame. The mechanism by which the strings of a violin are stretched or unstretched, will give some idea of the arrangement of the pegs employed for extending the cloth in this apparatus. By these means the cloth can be easily stretched or relaxed, when the oily varnish has exercised an action on its texture in the course of the operation. The whole being thus arranged, a liquid paste made with drying oil, which may be varied at pleasure, is applied to the cloth

To make liquid paste with drying oil.

Mix Spanish white or tobacco-pipe clay, or any other argillaceous matter, with water, and leave it at rest some hours, which will be sufficient to separate the argillaceous parts, and to produce a sediment. Stir the sediment with a broom, to complete the division of the earth; and after it has rested some seconds, decant the turbid water into an earthen or wooden vessel. By this process the earth will be separated from the sand and other foreign bodies, which are precipitated, and which must be thrown away. If the earth has been washed by the same process, on a large scale; it is divided by kneading it. The supernatant water is thrown aside, and the sediment placed in sieves, on pieces of cloth, where it is suffered to drain: it is then mixed up with oil rendered drying by a large dose of litharge, that is about a fourth of the weight of the oil. The consistence of thin paste being given to the mixture, it is spread over the cloth by means of an iron spatula, the length of which is equal to that of the breadth of the cloth. This spatula performs the part of a knife, and pushes forward the excess of matter above the quantity sufficient to cover the cloth. When the first stratum is dry, a second is applied. The inequalities produced by the coarseness of the cloth, or by an unequal extension of the paste, are smoothed down with pumice-stone. The pumice-stone is reduced to powder, and rubbed over the cloth with a piece of soft serge or cork dipped in water. The cloth must then be well washed in water to clean it; and after it is dried, a varnish of gum lac dissolved in linseed oil boiled with turpentine, is to be applied to it.

This preparation produces yellowish varnished cloth. When wanted black, mix lamp-black with the Spanish white, or tobacco-pipe clay, which forms the basis of the liquid paste. Various shades of grey may be obtained, according to the quantity of lamp-black which is added. Umber, Cologne earth, and different ochry argillaceous earths, may be used to vary the tints, without causing any addition to the expense.

To prepare fine printed varnished cloths.

The process thus described for manufacturing common varnished and polished cloths, may serve to give some idea of that employed for making fine cloths of the same kind, decorated with a coloured impression. The manufactories of Germany have varnished cloths embellished with large and small subjects, figures, and landscapes, well executed, and which are destined for covering furniture subjected to daily use.

This process, which is only an improvement of the former, requires a finer paste, and cloth of a more delicate texture. The stratum of paste is applied in the same manner, and when dry and polished, the cloth is taken from the frame and removed to the painter's table, where the art of the colourist and designer is displayed under a thousand forms; and, as in that of printed cottons, exhibits a richness of tints, and a distribution of subjects, which discover taste, and insure a ready sale for the articles manufactured.

The processes, however, employed in these two arts to extract the colouring parts are not the same. In the art of cotton-printing the colours are extracted by the bath, as in that of dyeing. In printing varnished cloths, the colouring parts are the result of the union of drying oil mixed with varnish; and the different colours employed in oil painting or painting in varnish.

The varnish applied to common oil cloth is composed of gum lac and drying linseed oil; but that destined for printed varnished cloths requires some choice, both in regard to the oil and the resinous matter which gives it consistence. Prepared oil of pinks and copal form a varnish very little coloured, pliable, and solid.

To prepare varnished silk.

Varnished silk, for making umbrellas, capots, coverings for hats, &c. is prepared in the same manner as the varnished and polished cloths already described, but with some variation in the liquid paste or varnish.

If the surface of the silk be pretty large, it is made fast to a wooden frame furnished with hooks and moveable pegs, such as that used in the manufacture of common varnished cloths. A soft paste, composed of linseed oil boiled with a fourth part of litharge; tobacco pipe clay, dried and sifted through a silk-sieve, 16 parts; litharge ground on porphyry with water, dried and sifted in the same manner, 3 parts; and lamp-black, 1 part. This paste is then spread in an uniform manner over the surface of the silk, by means of a long knife, having a handle at each extremity. In summer, twenty-four hours are sufficient for its desiccation. When dry the knots produced by the inequalities of the silk are smoothed with pumice-stone. This operation is performed with water, and when finished, the surface of the silk is washed. It is then suffered to dry, and flat copal varnish is applied.

If it be intended to polish this varnish, apply a second stratum; after which polish it with a ball of cloth and very fine tripoli. The varnished silk thus made, is very black, exceedingly pliable, and has a fine polish. It may be rumpled a thousand ways without retaining any fold, or even the mark of one. It is light, and thereby proper for coverings to hats, and for making cloaks and caps so useful to travellers in wet weather.

Another method.

A kind of varnished silk, which has only a yellowish colour, and which suffers the texture of the stuff to appear, is prepared with a mixture of 3 parts boiled oil of pinks, and 1 part of fat copal varnish, which is extended with a coarse brush or a knife. Two strata are sufficient when oil has been freed from its greasy particles over a slow fire, or when boiled with a fourth part of its weight of litharge.

The inequalities are removed by pumice-stone and water; after which the copal varnish is applied. This simple operation gives to white silk a yellow colour, which arises from the boiled oil and the varnish.

This varnished silk possesses all those qualities ascribed to certain preparations of silk which are recommended to be worn as jackets by persons subject to rheumatism.

To prepare water proof boots.

Boots and shoes may be rendered impervious to water by the following composition.—Take 3 oz. of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire: add thereto six drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add *seriatim* of tallow, 8 ounces; hog's-lard, 2 ounces; amber varnish, 4 ounces. Mix, and it will be fit for use immediately. The boots or other material to be treated, are to receive two or three coats, with a common blacking brush, and a fine polish is the result.

To make black japan.

Take of boiled oil, 1 gallon, umber, 8 oz. asphaltum, 3 oz. oil of turpentine, as much as will reduce it to the thinness required.

To preserve tiles.

After the adoption of glazing, varnishing, &c. to increase the hardness of tiles, tarring has been found completely to stop their pores, and to render them impervious to water. The process is practicable, and not expensive. Lime and tar, whale oil, or dregs of oil, are equally adapted to the purpose, and still cheaper. Tarring is particularly efficacious when tiles are cracked by the frost. It is calculated, that the expense of coal tar for a roof of a middling extent, and supposing such a roof to require one hundred weight, would not exceed two guineas.

To bronze plaister figures.

For the ground, after it has been sized and rubbed down, take Prussian blue, verditer, and spruce ochre. Grind them separately in water, turpentine, or oil, according to the work, and mix them in such proportions as will produce the colour desired. Then grind Dutch metal in a part of this composition: laying it with judgment on the prominent parts of the figure, which produces a grand effect.

To polish varnished furniture.

Take two ounces of tripoli powdered, put it in an earthen pot, with water to cover it; then take a piece of white flannel, lay it over a piece of cork or rubber, and proceed to polish the varnish, always wetting it with the tripoli and water. It will be known when the process is finished by wiping a part of the work with a sponge, and observing whether there is a fair even gloss. When this is the case, take a bit of mutton suet and fine flour, and clean the work.

To polish wood.

Take a piece of pumice stone, and water

and pass regularly over the work until the rising of the grain is cut down; then take powdered tripoli and boiled linseed oil, and polish the work to a bright surface.

To polish brass ornaments inlaid in wood.

File the brass very clean with a smooth file; then take some tripoli powdered very fine, and mix it with the linseed oil. Dip in this a rubber of hat, with which polish the work until the desired effect is obtained.

If the work is ebony, or black rose wood, take some elder coal powdered very fine, and apply it dry after you have done with the tripoli, and it will produce a superior polish.

The French mode of ornamenting with brass differs widely from ours; theirs being chiefly water-gilt (*or moulu*,) excepting the flutes of columns, &c. which are polished very high with rotten stone, and finished with elder coal.

To brown gun barrels.

After the barrel is finished rub it over with aqua fortis, or spirit of salt, diluted with water. Then lay it by for a week, till a complete coat of oil is formed. A little oil is then to be applied, and after rubbing the surface dry, polish it with a hard brush and a little bees' wax.

To make blacking.

Take of ivory black and treacle, each 12 oz. spermaceti oil, 4 oz. white wine vinegar, 4 pints.

Mix. This blacking recommended by Mr. Gray, lecturer on the materia medica, is superior in giving leather a finer polish than any of those that are advertised, as they all contain sulphuric acid, (oil of vitriol,) which is necessary to give it the polishing quality, but it renders leather rotten, and very liable to crack.

To make liquid blacking.

Take of vinegar, No. 18, (the common,) 1 quart, ivory-black, and treacle, each 6 oz. vitriolic acid, and spermaceti, (or common oil,) each 1 1-2 oz.

Mix the acid and oil first, afterwards add the other ingredients; if, when it is used, it does not dry quick enough on the leather, add a little more of the vitriol, a little at a time, till it dries quick enough. When there is too much of the vitriolic acid, which is various in its strength, the mixture will give it a brown colour.

N B. Vinegar is sold by numbers, viz. No. 18 (the weakest,) 19, 20, 21, 22. The celebrated blacking is made with No. 18. When this mixture is properly finished, the ivory-black will be about one-third the contents of the bottle.

To make Bailey's composition for blacking cakes.

Take gum tragacanth, one ounce; neat's foot oil, superfine ivory-black, deep blue, prepared from iron and copper, each two ounces; brown sugar candy, river water, each four ounces. Having mixed well these ingredients, evaporate the water, and form your cakes.

To make blacking balls for shoes.

Take mutton suet, 4 ounces; bees-wax, one ounce; sweet oil, one ounce; sugar candy and gum-arabic, one drachm each, in fine powder: melt these well together over a gentle fire, and add thereto about a spoonful of turpentine, and lamp-black sufficient to give it a good black colour. While hot enough to run, make it into a ball, by pouring the liquor into a tin mould; or let it stand till almost cold: or it may be moulded by the hand.

To make liquid japan blacking.

Take 3 ounces of ivory-black, 2 oz. of coarse sugar, one ounce of sulphuric acid, one ounce of muriatic acid, one table-spoonful of sweet oil and lemon acid, and one pint of vinegar. First mix the ivory-black and sweet oil together, then the lemon and sugar, with a little vinegar, to qualify the blacking; then add the sulphuric and muriatic acids, and mix them all well together.

Observation. The sugar, oil, and vinegar, prevent the acids from injuring the leather, and add to the lustre of the blacking.

A cheap method.

Ivory-black, two ounces; brown sugar, one ounce and a half; and sweet oil, half a table-spoonful. Mix them well, and then gradually add half a pint of small beer.

Another method.

A quarter of a pound of ivory-black, a quarter of a pound of moist sugar, a table-spoonful of flour, a piece of tallow about the size of a walnut, and a small piece of gum-arabic. Make a paste of the flour, and whilst hot, put in the tallow, then the sugar, and afterwards mix the whole well together in a quart of water.

To render leather water proof.

This is done by rubbing or brushing into the leather a mixture of drying oils, and any of the oxides or calxes of lead, copper, or iron: or by substituting any of the gummy resins, in the room of the metallic oxides.—*Repertory*, vol. x.

To make varnish for coloured drawings.

Take of Canada balsam one ounce, spirit of turpentine, two ounces. Mix them together. Before this composition is applied, the drawing or print should be sized with a solution of isinglass in water: and when dry, apply the varnish with a camel's-hair brush.

To make furniture paste.

Scrape four ounces of bees' wax into a basin, and add as much oil of turpentine as will moisten it through. Now powder a quarter of an ounce of resin, and add as much Indian red as will bring it to a deep mahogany colour. When the composition is properly stirred up, it will prove an excellent cement or paste for blemishes in mahogany, and other furniture.

Another method.

Scrape four ounces of bees' wax as before. To a pint of oil of turpentine, in a glazed pipkin, add an ounce of alkanet-root. Cover it close, and put it over a slow fire, attending it carefully that it may not boil over, or catch fire. When the liquid is of a deep red, add as much of it to the wax as will moisten it through, also a quarter of an ounce of powdered resin. Cover the whole close, and let it stand six hours, when it will be fit for use.

To make furniture oil.

Take linseed-oil, put it into a glazed pipkin, with as much alkanet root as it will cover. Let it boil gently, and it will become of a strong red colour: when cool it will be fit for use.

To make wash for preserving drawings made with a black lead pencil.

A thin wash of isinglass will fix either black lead, or hard black chalk, so as to prevent their rubbing out; or the same effect may be produced by the simple application of skimmed milk, as has been proved by frequent trials. The best way of using the latter is to lay the drawing flat upon the surface of the milk; and then taking it up by one corner till it drains and dries. The milk must be perfectly free from cream, or it will grease the paper.

To make varnish for wood, which resists the action of boiling water.

Take a pound and a half of linseed-oil, and boil it in a red copper vessel, not tinned, holding suspended over it, in a small linen bag, five ounces of litharge, and three ounces of pulverized minium; taking care that the bag does not touch the bottom of the vessel. Continue the ebullition until the oil acquires a deep brown colour; then take away the bag, and substitute another in its place, containing a clove of garlic; continue the ebullition, and renew the clove of garlic seven or eight times, or rather put them all in at once.

Then throw into the vessel a pound of yellow amber, after having melted it in the following manner:—Add to the pound of amber, well pulverized, two ounces of linseed-oil, and place the whole on a strong fire. When the fusion is complete, pour it boiling into the prepared linseed-oil, and continue to leave it boiling for two or three minutes, stirring the whole up well. It is then left to settle; the composition is decantered and preserved, when it becomes cold, in well corked bottles.

After polishing the wood on which this varnish is to be applied, you give to the wood the colour required; for instance, for walnut wood, a slight coat of a mixture of soot with the essence of turpentine. When this colour is perfectly dry, give it a coat of varnish with a fine sponge, in order to spread it very equal; repeat these coats four times, taking care always to let the preceding coat be dried.—*Annales de l'industrie*, 1821.

To restore the blackness of old leather chairs, &c.

Many families, especially in the country, possess chairs, settees, &c. covered with black leather; these, impaired by long use, may be restored nearly to their original good colour and gloss by the following easy and approved process:—Take two yolks of new laid eggs, and the white of one. Let these be well beaten up, and then shaken in a glass vessel or jug, to become like thick oil; dissolve in about a table-spoonful or less of geneva, an ordinary tea-lump of loaf-sugar; make this thick with ivory black, well worked up with a bit of stick; mix with the egg for use. Let this be laid on as blacking ordinarily is for shoes; after a very few minutes polish with a soft, very clean brush, till completely dry and shining, then let it remain a day to harden.

The same process answers admirably for ladies' cordovan, or gentlemen's dress-shoes, but with the following addition for protecting the stockings from soil. Let the white or glaire of eggs be shaken in a large glass phial until it becomes a perfect oil; brush over the inner edges of the shoes with it, and when completely dry, it will prevent all soiling from the leather. This requires to be repeated.

To polish and soften ivory.

This article is polished with putty and water, by means of a rubber, made of hat, which, in a short time, produces a fine gloss. The following directions are given to soften ivory. Let it stand in a warm place 48 hours, and you will be able to bend the ivory in any form.

To varnish drawings and card work.

Boil some clear parchment cuttings in water, in a glazed pipkin, till they produce a very clear size. Strain it and keep it for use.

Give the work two coats of the size, passing the brush quickly over the work, not to disturb the colours.

To make turpentine varnish.

Mix one gallon of oil of turpentine, and five pounds of powdered resin; put it in a tin can, on a stove, and let it boil for half an hour. When cool it is fit for use.

To make varnish for violins, &c.

To a gallon of rectified spirit of wine, add six ounces of gum sandarac, three ounces of gum mastic, and half a pint of turpentine varnish. Put the whole into a tin can, which keep in a warm place, frequently shaking it, for twelve days, until it is dissolved. Then strain and keep it for use.

To varnish harps and dulcimers.

Prepare the work with size and red ochre; then take ochre, burnt umber, and red lead, well ground, and mix up a dark brown colour in turpentine varnish, adding so much oil of turpentine that the brush may just be able to pass over the work fair and even. While yet wet, take a muslin sieve, and sift as much Dutch metal, previously powdered, upon it as is requisite to produce the effect, after which varnish and polish it.

To preserve steel goods.

Mr. Aikin recommends a thin coating of caoutchuc as an excellent preservative of iron and steel articles from the action of the air and moisture; its unalterability, consistence when heated, adhesion to iron and steel, and facility of removal, render it on admirable substance for this purpose.

The caoutchouc is to be melted in a close vessel, that it may not inflame. It will require nearly the temperature of fusing lead, and must be stirred to prevent burning.

Mr. Parkins, to whom Mr. Aikin communicated this process, has made much use of it in his blocks, plates, dies, &c. He mixes some oil of turpentine with the caoutchouc, which renders it easily applicable, and leaves the substance, when dry, as a firm varnish, impermeable to moisture. This, when required, may easily be removed by a soft brush dipped in warm oil of turpentine.

To prepare oil for watch-work, &c.

Oil used for diminishing frictions in delicate machinery, should be free from all acids and mucilage.

Put into a matrass or glass flask, a portion of any fine oil, with seven or eight times its weight of alcohol, and heat the mixture almost to boiling, decant the clear upper stratum of fluid, and suffer it to cool: a solid portion of fatty matter separates, which is to be removed, and then the alcoholic solution evaporated in a retort or basin, until reduced to one-fifth of its bulk. The fluid part of the oil will be deposited. It should be colourless and tasteless, almost free from smell, without action on infusion of litmus, having the consistence of white olive oil, and not easily congealable.—*Journal of Science*, 1822.

To make papier machee.

This is a substance made of cuttings of white or brown paper, boiled in water, and beaten in a mortar till they are reduced into a kind of paste, and then boiled with a solution of gum arabic, or of size, to give tenacity to the paste, which is afterwards formed into different toys, &c. by pressing it into oiled moulds. When dry, it is done over with a mixture of size and lamp-black, and afterwards varnished. The black varnish for these toys, according to Dr. Lewis, is prepared as follows: Some colophony, or turpentine, boiled down till it becomes black and friable, is melted in a glazed earthen vessel, and thrice as much amber in fine powder sprinkled in by degrees, with the addition of a little spirit or oil of turpentine now and then: when the amber is melted, sprinkle in the same quantity of sarcocolla, continuing to stir them, and to add more spirit of turpentine, till the whole becomes fluid; then strain out the clear through a coarse hair bag, pressing it gently between hot boards. This varnish, mixed with ivory-black in fine powder, is applied, in a hot room, on the dried paper paste; which is then set in a gentle heated oven, next day in a hotter oven, and the third day in a very hot one, and let stand each time till the oven grows cold. The paste thus varnished is hard, durable, glossy, and bears liquors hot or cold.

To varnish glass.

Pulverize a quantity of gum adragant, and let it dissolve for twenty-four hours in the white of eggs well beat up; then rub it gently on the glass with a brush.

To apply copal varnish to the reparation of opake enamels.

The properties manifested by these varnishes, which render them proper for supplying the vitreous and transparent coating of enamel, by a covering equally brilliant, but more solid, and which adheres to vitreous compositions, and to metallic surfaces, admit of their being applied to other purposes besides those here enumerated.

By slight modifications they may be used also for the reparation of opake enamel which has been fractured. These kinds of enamel admit the use of cements coloured throughout, or only superficially, by copal varnish charged with colouring parts. On this account they must be attended with less difficulty in the reparation than transparent enamel, because they do not require the same reflection of the light. Compositions of paste, therefore, the different grounds of which may always harmonize with the colours or ground of the pieces to be repaired, and which may be still strengthened by the same tint introduced into the solid varnish, with which the articles are glazed, will answer the views of the artist in a wonderful manner.

The base of the cement ought to be pure clay without colour, and exceedingly dry. If solidity be required, ceruse is the only substance that can be substituted in its place. Drying oil of pinks will form an excellent excipient, and the consistence of the cement ought to be such that it can be easily extended by a knife or spatula, possessed of a moderate degree of flexibility. This sort of paste soon dries. It has the advantage also of presenting to the colours, applied to it with a brush, a kind of ground which contributes to their solidity. The compound mastic being exceedingly drying, the application of it will be proper in cases where speedy reparation of the damaged articles is required.

In more urgent cases, the paste may be composed with ceruse, and the turpentine copal varnishes; which dries more speedily than oil of pinks; and the colours may then be glazed with the ethereal copal varnish.

The application of the paste will be necessary only in cases when the accident, which has happened to the enamel, leaves too great a vacuity to be filled up by several strata, of coloured varnish. But in all cases the varnish ought to be well dried, that it may acquire its full lustre by polishing.

To make white copal varnish.

White oxide of lead, ceruse, Spanish white, white clay. Such of these substances as are preferred ought to be carefully dried. Ceruse and clay obstinately retain a great deal of humidity, which would oppose their adhesion to drying oil or varnish. The cement then crumbles under the fingers, and does not assume a body.

Another.

On 16 ounces of melted copal, pour 4, 6, or 8 ounces of linseed oil boiled, and quite free from grease. When well mixed by repeated stirrings, and after they are pretty cool, pour in 16 ounces of the essence of Venice turpentine. Pass the varnish through a cloth. Amber varnish is made the same way.

To make black copal varnish.

Lamp-black, made of burnt vine twigs black of peach-stones. The lamp-black must be carefully washed, and afterwards dried.

Washing carries off a great many of its impurities.

To make yellow copal varnish.

Yellow oxide of lead of Naples and Montpellier, both reduced to impalpable powder. These yellows are hurt by the contact of iron and steel; in mixing them up, therefore, a horn spatula with a glass mortar and pestle must be employed.

Gum guttæ, yellow ochre, or Dutch pink, according to the nature and tone of the colour to be imitated.

To make blue copal varnish.

Indigo, prussiate of iron, (Prussian blue) blue verditer, and ultra marine. All these substances must be very much divided.

To make green copal varnish.

Verdigris, crystallized verdigris, compound green, (a mixture of yellow and blue.) The first two require a mixture of white in proper proportions, from a fourth to two-thirds, according to the tint intended to be given. The white used for this purpose is ceruse, or the white oxide of lead, or Spanish white, which is less solid, or white of Moudon.

To make red copal varnish.

Red sulphurated oxide of mercury (cinnabar vermilion.) Red oxide of lead (minium,) different red ochres, or Prussian reds, &c.

To make purple copal varnish.

Cochineal, carmine, and carminated lakes, with ceruse and boiled oil.

Brick red.

Dragon's blood.

Chamois colour.

Dragon's blood, with a paste composed of flowers of zinc, or, what is still better, a little red vermilion.

Violet.

Red sulphurated oxide of mercury mixed with lamp-black, washed very dry, or with the black of burnt vine twigs; and to render it mellower, a proper mixture of red, blue, and white.

Pearl grey.

White and black; white and blue; for example ceruse and lamp-black; ceruse and indigo.

Flaxen grey.

Ceruse, which forms the ground of the paste, mixed with a small quantity of Cologne earth; as much English red, or carminated lake, which is not so durable, and a particle of prussiate of iron, (Prussian blue.)

To dissolve elastic gum, &c.

M. Grossart, by an ingenious method, succeeded in forming India rubber into elastic tubes. Cut a bottle of the gum circularly, in a spiral slip of a few lines in breadth; then plunge the whole of the slip into vitriolic ether, till it becomes softened; half an hour is generally sufficient for this purpose. The slip is then taken out of the liquid, and one of the extremities applied to the end of a mould, first rolling it on itself, and pressing it, then mounting spirally along the cylinder, taking care to lay over and compress with the hand every edge, one against the other, so that there may not be any vacant space, and that all the edges may join exactly; the whole is then to be bound hard with a tape of an inch in width, taking care to turn it the same way with the slip of caoutchouc. Over the tape, packthread is to be applied, in such a manner, that by every turn of the thread joining another, an equal pressure is given to every part. It is then left to dry, and the tube is made. In removing the bandage great care must be taken, that none of the outward surface, which may have lodged within the interstices of the tape, (of which the caoutchouc takes the exact impression,) may be pulled asunder. If it is found difficult to withdraw the mould, it may be plunged into hot water. If the mould were previously smoked or rubbed with chalk, it might be removed with less difficulty. Polished metallic cylinders are the most eligible moulds for this purpose. As solvents, oils of turpentine and lavender may be employed, but both are much slower of evaporating the ether, and the oil of turpentine, particularly, appears always to have a kind of stickiness. Nevertheless, there is a solvent which has not that inconvenience, is cheaper, and may easily be procured by every one, viz. *water.* Proceed in the same manner as with ether. The caoutchouc is sufficiently prepared for use when it has been a quarter of an hour in boiling water: by this time its edges are sometimes transparent. It is to be turned spirally round the mould, and replunged frequently into the boiling water, during the time employed in forming the tube. When the whole is bound with packthread, it is to be kept some hours in boiling water, after which it is to be dried, still keeping on the binding. This method may be successfully employed in forming the larger sort of tubes, and in any other instruments, but it would be impracticable to make the small tubes in this way.

Oil of lavender, of turpentine, and of spikenard, dissolve elastic gum, with the assistance of a gentle heat; but a mixture of volatile oil and alcohol forms a better solvent for it than oil alone, and the varnish dries sooner. If boiled in a solution of alum in water, it is rendered softer than in water alone. Yellow wax, in a state of ebullition, may be saturated with it, by putting it, cut in small pieces, gradually into it. By this means a pliable varnish is formed, which may be applied to cloth with a brush, but it still retains a clamminess.

To make caoutchouc varnish.

Take caoutchouc, or elastic resin, boiled linseed oil, essence of turpentine, each 16 oz.

Cut the caoutchouc, into thin slips, and put them into a matrass placed in a very hot sand-bath. When the matter is liquefied, add the linseed oil in a state of ebullition, and then the essence warm. When the varnish has lost a great part of its heat, strain it through a piece of linen, and preserve it in a wide-mouthed bottle. This varnish dries very slowly, a fault which is owing to the peculiar nature of the caoutchouc.

The invention of air balloons led to the idea of applying caoutchouc to the composition of varnish. It was necessary to have a varnish which should unite great pliability and consistence. No varnish seemed capable of corresponding to these views, except that of caoutchouc, but the desiccation of it is exceedingly tedious.

To varnish balloons.

The compositions for varnishing balloons have been variously modified; but, upon the whole, the most approved appears to be the bird-lime varnish of M. Faujas St. Fond, prepared after M. Cavallo's method as follows: "In order to render linseed oil drying, boil it with 2 ounces of sugar of lead, and 3 ounces of litharge, for every pint of oil, till they are dissolved, which may be in half an hour. Then put a pound of bird-lime, and half a pint of the drying oil, into an iron or copper vessel, whose capacity should equal about a gallon, and let it boil very gently over a slow charcoal fire, till the bird-lime ceases to crackle, which will be in about half, or three-quarters of an hour; then pour upon it 2 1-2 pints more of the drying oil, and let it boil about an hour longer; stirring it frequently with an iron or wooden spatula. As the varnish, whilst boiling, and especially when nearly ready, swells very much, care should be taken to remove, in those cases, the pot from the fire, and to replace it when the varnish subsides; otherwise it will boil over. Whilst the stuff is boiling, the operator should occasionally examine whether it has boiled enough; which may be known by observing whether, when rubbed between two knives, which are then to be separated from one another, the varnish forms threads between them, as it must then be removed from the fire. When nearly cool, add about an equal quantity of oil of turpentine. In using the varnish, the stuff must be stretched, and the varnish applied luke-warm. In 24 hours it will dry."

Another.

As the elastic resin, known by the name of Indian rubber, has been much extolled for a varnish, the following method of making it, as practised by M. Blanchard, may not prove unacceptable.—Dissolve elastic gum, cut small, in five times its weight of rectified essential oil of turpentine, by keeping them some days together: then boil one ounce of this solution in eight ounces of drying linseed oil for a few minutes; strain the solution, and use it warm.

To varnish rarefied air balloons.

With regard to the rarefied air machines, M. Cavallo recommends, first, to soak the cloth in a solution of sal-ammoniac and common size, using one pound of each to every gallon of water; and when the cloth is quite dry, to paint it over on the inside with some earthy colour, and strong size or glue. When this paint has dried perfectly, it will then be proper to cover it with oily varnish, which might dry before it could penetrate quite through the cloth. Simply drying linseed oil will answer the purpose as well as any, provided it be not very fluid.

To make varnish for silks, &c.

To 1 quart of cold-drawn linseed-oil, poured off from the lees (produced on the addition of unslacked lime, on which the oil has stood 8 or 10 days at the least, in order to communicate a drying quality,—or brown umber, burnt and powdered, which will have the like effect) and half an ounce of litharge; boil them for half an hour, then add half an ounce of the copal varnish. While the ingredients are on the fire, in a copper vessel, put in 1 oz. of chios turpentine, or common resin, and a few drops of neatsfoot oil, and stir the whole with a knife; when cool it is ready for use. The neatsfoot oil prevents the varnish from being sticky or adhesive, and may be put into the linseed-oil at the same time with the lime, or burnt umber. Resin or chios turpentine may be added till the varnish has attained the desired thickness.

The longer the raw linseed-oil remains on the unslacked lime or umber, the sooner will the oil dry after it is used; if some months, so much the better; such varnish will set, that is to say, not run, but keep its place on the silk in four hours; the silk may then be turned and varnished on the other side.

To make pliable varnish for umbrellas.

Take any quantity of caoutchouc, as 10 or 12 ounces, cut into small bits with a pair of scissors, and put a strong iron ladle (such as painters, plumbers, or glaziers melt their lead in,) over a common pit-coal or other fire; which must be gentle, glowing, and without smoke. When the ladle is hot put a single bit into it; if black smoke issues, it will presently flame and disappear, or it will evaporate without flame: the ladle is then too hot. When the ladle is less hot, put in a second bit, which will produce a white smoke; this white smoke will continue during the operation, and evaporate the caoutchouc; therefore no time is to be lost, but little bits are to be put in, a few at a time, till the whole are melted; it should be continually and gently stirred with an iron or brass spoon. The instant the smoke changes from white to black, take off the ladle, or the whole will break out into a violent flame, or be spoiled, or lost. Care must be taken that no water be added, a few drops only of which would, on account of its expansibility, make it boil over furiously and with great noise; at this period of the process, 2 pounds or 1 quart of the best drying oil is to be put into the melted caoutchouc and stirred till hot, and the whole poured into a glazed vessel through a coarse gauze, or wire sieve. When settled and clear, which will be in a few minutes, it is fit for use, either hot or cold.

The silk should be always stretched horizontally by pins or tenter-hooks on frames: (the greater they are in length the better,) and the varnish poured on *cold, in hot weather*, and *hot, in cold weather*. It is perhaps best, always to lay it on when cold. The art of laying it on properly, consists in making no intestine motion in the varnish, which would create minute bubbles, therefore brushes of every kind are improper, as each bubble breaks in drying, and forms a small hole, through which the air will transpire.

This varnish is pliant, unadhesive, and unalterable by weather.

Varnish used for Indian shields.

Shields made at Silhet, in Bengal, are noted throughout India, for the *lustre and durability of the black varnish* with which they are covered; Silhet shields constitute, therefore, no inconsiderable article of traffic, being in request among natives who carry arms, and retain the ancient predilection for the scimitar and buckler. The varnish is composed of the expressed juice of the marking nut, *Semecarpus Anacardium*, and that of another kindred fruit *Holigarna Longifolia.*

The shell of the *Semecarpus Anacardium* contains between its integuments numerous cells, filled with a black, acrid, resinous juice; which likewise is found, though less abundantly, in the wood of the tree. It is commonly employed as an indelible ink, to mark all sorts of cotton cloth. The colour is fixed with quick lime. The cortical part of the fruit of *Holigarna Longifolia* likewise contains between its laminæ numerous cells, filled with a black, thick, acrid fluid. The natives of Malabar extract by incision, with which they varnish targets.

To prepare the varnish according to the method practised in Silhet, the nuts of the *Semecarpus Anacardium*, and the berries of the *Holigarna Longifolia*, having been steeped for a month in clear water, are cut transversely, and pressed in a mill. The expressed juice of each is kept for several months, taking off the scum from time to time. Afterwards the liquor is decanted, and two parts of the one are added to one part of the other, to be used as varnish. Other proportions of the ingredients are sometimes employed; but in all, the resinous juice of the *Semecarpus* predominates. The varnish is laid on like paint, and when dry, is polished by rubbing it with an agate, or smooth pebble. This varnish also prevents destruction of wood, &c. by the *white ant.*

To varnish like gold silver leaf.

Fix the leaf on the subject, similar to gold leaf, by the interposition of proper glutinous matters, spread the varnish upon the piece with a pencil. When the first coat is dry wash the piece again and again with the varnish till the colour appears sufficiently deep. What is called gilt leather, and many picture frames, have no other than this gilding; washing them with a little rectified spirits of wine affords a proof of this; the spirit dissolving the varnish, and leaving the silver leaf of its own whiteness; for plain frames thick tin foil may be used instead of silver. The tin leaf fixed on the piece with glue is to be burnished, then polished with emery and a fine linen cloth, and afterwards with putty applied in the same manner: being then lacquered over with varnish five or six times, it looks very nearly like burnished gold. The same varnish, made with a less proportion of colouring materials, is applied also on works of brass; both for heightening the colour of the metal to a resemblance with that of gold, and for preserving it from being tarnished by the air.

To recover varnish.

Clear off the filth with a ley made of potash, and the ashes of the lees of wine; then take 48 ounces of potash, and 16 of the above-mentioned ashes, and put them into six quarts of water, and this completes the ley.

To polish varnish.

This is effected with pumice stone and tripoli earth. The pumice stone must be reduced to an impalpable powder, and put upon a piece of serge moistened with water: with this rub lightly and equally the varnished substance. The tripoli must also be reduced to a very fine powder, and put upon a clean woollen cloth, moistened with olive oil, with which the polishing is to be performed. The varnish is then to be wiped off with soft linen, and when quite dry, cleaned with starch of Spanish white, and rubbed with the palm of the hand.

OIL AND WATER COLOURS.

HOUSE PAINTING.

To mix the colours for house painting.

All simple or compound colours, and all the shades of colour which nature or art can produce, and which might be thought proper for the different kinds of painting, would form a very extensive catalogue, were we to take into consideration only certain external characters, or the intensity of their tint. But art, founded on the experience of several centuries, has prescribed bounds to the consumption of colouring substances, and to the application of them, to particular purposes. To cause a substance to be admitted into the class of colouring bodies employed by painters, it is not sufficient for it to contain a colour; to brightness and splendour it must also unite durability in the tint or colour which it communicates.

To make black paint.

Usage requires attention in the choice of the matters destined for black. The following are their properties:

Black from peach-stones is dull.

Ivory-black is strong and beautiful, when it has been well attenuated under the muller.

Black from the charcoal of beech wood, ground on porphyry, has a bluish tone.

Lamp-black may be rendered mellower by making it with black which has been kept an hour in a state of redness in a close crucible. It then loses the fat matter which accompanies this kind of soot.

Black furnished by the charcoal of vine-twigs, ground on porphyry, is weaker, and of a dry dirty grey colour, when coarse and alone, but it becomes blacker the more the charcoal has been divided. It then forms a black very much sought after, and which goes a great way.

To make paints from lamp black.

The composition of lamp black is very extensive in common painting. It serves to modify the brightness of the tones of the other colours, or to facilitate the composition of secondary colours. The oil paint applied to iron grates and railing, and the paint applied to paper snuff-boxes, to those made of tin plate, and to other articles with dark grounds, consume a very large quantity of this black. Great solidity may be given to works of this kind, by covering them with several coatings of the fat turpentine, or golden varnish, which has been mixed with lamp black, washed in water, to separate the foreign bodies introduced into it, by the negligence of the workmen who prepare it.

After the varnish is applied, the articles are dried in a stove, by exposing them to a heat somewhat greater than that employed for articles of paper. Naples yellow, which enters into the composition of black varnish, is the basis of the dark brown observed on tobacco boxes of plate-iron, because this colour changes to brown when dried with varnish.

To make a superior lamp black.

Suspend over a lamp a funnel of tin plate, having above it a pipe, to convey from the apartment the smoke which escapes from the lamp. Large mushrooms, of a very black carbonaceous matter, and exceedingly light, will be formed at the summit of the cone. This carbonaceous part is carried to such a state of division as cannot be given to any other matter, by grinding it on a piece of porphyry.

This black goes a great way in every kind of painting. It may be rendered drier by calcination in close vessels.

The funnel ought to be united to the pipe, which conveys off the smoke, by means of wire, because solder would be melted by the flame of the lamp.

To make black from ground pitcoal.

The best for this purpose is that which has a shining fracture. It affords perhaps, the most useful brown the artist can place on his palet; being remarkably clear, not so warm as Vandyke brown, and serving as a shadow for blues, reds, or yellows, when glazed over them. It seems almost certain that Titian made large use of this material. Coal, when burnt to a white heat, then quenched in water, and ground down, gives an excellent blue black. This belongs to artists colours.

To make black from wine lees.

This black results from the calcination of wine lees and tartar; and is manufactured on a large scale in some districts of Germany, in the environs of Mentz, and even in France. This operation is performed in large cylindric vessels, or in pots, having an aperture in the cover to afford a passage to the smoke, and to the acid and alkaline vapours which escape during the process. When no more smoke is observed, the operation is finished. The remaining matter, which is merely a mixture of salts and a carbonaceous part very much attenuated, is then washed several times in boiling water; and it is reduced to the proper degree of fineness by grinding it on porphyry.

If this black be extracted from dry lees it is coarser than that obtained from tartar; because the lees contain earthy matter which are confounded with the carbonaceous part.

This black goes a great way, and has a velvety appearance. It is used chiefly by copper-plate printers.

Another.

Peach stones, burnt in a close vessel, produce a charcoal, which, when ground on porphyry is employed in painting to give an old grey.

Another.

Vine twigs reduced to charcoal give a bluish black, which goes a great way. When mixed with white it produces a silver white, which is not produced by other blacks; it has a pretty near resemblance to the black of peach stones; but to bring this colour to the utmost degree of perfection, it must be carefully ground on porphyry.

To make ivory and bone black.

Put into a crucible, surrounded by burning coals, fragments or turnings of ivory, or of the osseous parts of animals, and cover it closely. The ivory or bones, by exposure to the heat, will be reduced to charcoal. When no more smoke is seen to pass through the joining of the cover, leave the crucible over the fire for half an hour longer, or until it has completely cooled. There will then be found in it a hard carbonaceous matter, which, when pounded and ground on porphyry with water, is washed on a filter with warm water, and then dried. Before it is used it must be again subjected to the matter.

Black furnished by bones is reddish. That produced by ivory is more beautiful. It is brighter than black obtained from peach stones. When mixed in a proper dose, with white oxyde of lead, it forms a beautiful pearl grey. Ivory black is richer. The Cologne and Cassel black, are formed from ivory.

To paint in white distemper.

Grind fine in water, Bougival white, a kind of marl, or chalky clay, and mix it with size. It may be brightened by a small quantity of indigo, or charcoal black.

To make white paint.

The white destined for varnish or oil requires a metallic oxide, which gives more body to the colour. Take ceruse, reduced to powder, and grind it with oil of pinks, and 1-4 oz. of sulphate of zinc, for each pound of oil. Apply the second coating without the sulphat of zinc, and suffer it to dry. Cover the whole with a stratum of sandarac varnish. This colour is durable, brilliant and agreeable to the eye.

Boiled linseed oil might be employed instead of oil of pinks, but the colour of it would in some degree injury the purity of the white.

Another.

White is prepared also with pure white oxide of lead, ground with a little essence, added to oil of pinks, and mixed with gallipot varnish. The colour may be mixed also with essence diluted with oil, and without varnish, which is reserved for the two last coatings. If for a lively white, the colour is heightened with a little Prussian blue, or indigo, or with a little prepared black. The latter gives it a grey cast. But pure white lead, the price of which is much higher than ceruse, is reserved for valuable articles. In this particular case, if a very fine durable white be required, grind it with a little essence, and mix it with sandarac varnish.

To paint in light grey, and distemper.

Ceruse, mixed with a small quantity of lamp black, composes a grey, more or less charged according to the quantity of black. With this matter, therefore, mixed with black in different doses, a great variety of shades may be formed from the lightest to the darkest grey.

If this colour be destined for distemper, it is mixed with water; if intended for oil painting, it is ground with nut oil, or oil of pinks; and with essence added to oil, if designed for varnish. This colour is durable and very pure, if mixed with camphorated mastic varnish: the gallipot varnish renders it so solid that it can bear to be struck with a hammer, if, after the first stratum it has been applied with varnish, and without size. For the last coating sandarac varnish, and camphorated ditto are proper; and for the darkest grey, spirituous sandarac varnish.

To make economical white house paint.

Skim milk, 2 quarts, fresh slaked lime, 8 oz. linseed oil, 6 oz. white burgundy pitch, 2 oz. Spanish white, 3 pounds.

The lime to be slaked in water, exposed to the air, mixed in about one-fourth of the milk; the oil in which the pitch is previously dissolved, to be added, a little at a time; then the rest of the milk; and afterwards the Spanish white. This quantity is sufficient for 27 square yards, two coats, and the expense not more than ten pence.

To make pearl grey paint.

If a particle of blue be substituted for the black in the preceding composition, or if this blue be combined with a slight portion of black, a silver or pearl grey will be obtained; but that the ground may not be altered by a foreign tint, the colour for the first coating must be ground with essence mixed with a little oil of pinks: for the succeeding strata, grind with camphorated mastic varnish, softened with a little oil of pinks, and mix the colour with the same varnish. The pearl grey will be still brighter, if the last stratum be glazed with sandarac varnish mixed with a little colour.

To make flaxen grey.

Ceruse still predominates in this colour, which is treated as the other greys, but with this difference, that it admits a mixture of lake instead of black. Take the quantity, therefore, of ceruse necessary, and grind it separately. Then mix it up, and add the lake and Prussian blue, also ground separately. The quantities of the last two colours ought to be proportioned to the tone of colour required.

This colour is proper for distemper, varnish, and oil painting. For varnish, grind it with mastic gallipot varnish, to which a little oil of pinks has been added, and then mix it up with common gallipot varnish. For oil painting, grind with unprepared oil of pinks, and mix up with resinous drying nut-oil. The painting is brilliant and solid.

When the artist piques himself in carefully preparing those colours which have splendour, it will be proper, before he commences his labour, to stop up the holes formed by the heads or the nails in wainscotting with a cement made of ceruse or putty.

Every kind of sizing which, according to usual custom, precedes the application of varnish, ought to be proscribed as highly prejudicial, when the wainscotting consists of fir-wood. Sizing may be admitted for plaister, but without any mixture. A plain stratum of strong glue and water spread over it, is sufficient to fill up the pores to prevent any unnecessary consumption of the varnish.

The first stratum of colour, is ceruse without any mixture, ground with essence added to a little oil of pinks, and mixed up with essence. If any of the traces are uneven, rub it lightly, when dry, with pumice-stone. This operation contributes greatly to the beauty and elegance of the polish when the varnish is applied.

The second stratum is composed of ceruses changed to flaxen grey by the mixture of a little Cologne earth, as much English red or lake, and a particle of Prussian blue. First so make the mixture with a small quantity of ceruse, that the result shall be a smoky grey by the addition of the Cologne earth. The red which is added, makes it incline to flesh colour, and the Prussian blue destroys the latter to form a dark flaxen grey. The addition of ceruse brightens the tone. This stratum and the next are ground, and mixed up with varnish as before.

This mixture of colours which produces flaxen grey, has the advantage over pearl grey, as it defends the ceruse from the impression of the air and light, which makes it assume a yellowish tint. Flaxen grey, composed in this manner, is unalterable. Besides, the essence which forms the vehicle of the first stratum contributes to bring forth a colour, the tone of which decreases a little by the effect of drying. This observation ought to serve as a guide to the artists, in regard to the tint, which is always stronger in a liquid mixture than when the matter composing it is extended in a thin stratum, or when it is dry.

To make oak wood colour.

The basis of this colour is still formed of ceruse. Three-fourths of this oxide, and a fourth of ochre de rue, umber earth, and yellow de Berri; the last three ingredients being employed in proportions which lead to the required tint, give a matter equally proper for distemper, varnish, and oil.

To make walnut wood colour.

A given quantity of ceruse, half that quantity of ochre de rue, a little umber earth, red ochre, and yellow ochre de Berri, compose this colour proper for distemper, varnish, and oil.

For varnish, grind with a little drying nut-oil, and mix up with the gallipot varnish.

For oil painting, grind with fat oil of pinks added to drying oil or essence, and mix up with plain drying oil, or with resinous drying oil.

To make Naples and Montpellier yellow.

The composition of these is simple, yellow ochre mixed with ceruse, ground with water, if destined for distemper; or drying nut-oil and essence, in equal parts, if intended for varnish; and mixed up with camphorated mastic varnish; if for delicate objects, or with gallipot varnish, give a very fine colour, the splendour of which depends on the doses of the ceruse; which must be varied according to the particular nature of the colouring matter employed. If the ground of the colour is furnished by ochre, and if oil painting be intended, the grinding with oil added to essence may be omitted, as essence alone will be sufficient. Oil, however, gives more pliability and more body.

To make jonquil.

This is employed only in distemper. It may, however, be used, with varnish. A vegetable colour serves as its base. It is made with Dutch pink and ceruse, and ground with mastic gallipot varnish, and mixed up with gallipot varnish.

To make golden yellow colour.

Cases often occur when it is necessary to produce a gold colour without employing a metallic substance. A colour capable of forming an illusion is then given to the composition, the greater part of which consists of yellow. This is accomplished by Naples or Montpellier yellow, brightened by Spanish white, or by white of Morat, mixed with ochre de Berri and realgar. The last substance, even in small quantity, gives to the mixture a colour imitating gold, and may be employed in distemper, varnish, or oil. When destined for oil, it is ground with drying or pure nut-oil added to essence, and mixed up with drying oil.

To make chamois or buff colour.

Yellow is the foundation of chamois colour, which is modified by a particle of minium, or what is better, cinnabar and ceruse in small quantity. This colour may be employed in distemper varnish, and oil. For varnish, it is ground with one half common oil of pinks, and one half of mastic gallipot varnish. It is mixed with common gallipot varnish. For oil painting, it is ground and mixed up with drying oil.

To make olive colour for oil and varnish.

Olive colour is a composition the shades of which may be diversified. Black and a little blue, mixed with yellow, will produce an olive colour. Yellow de Berri, or d'Auvergne, with a little verdigris and charcoal, will also form this colour.

It is ground and mixed up with mastic, gallipot, and common gallipot varnishes. For oil painting, it is ground with oil added to essence, and mixed up with drying oil.

To make olive colour for distemper.

When intended for distemper, it will be necessary to make a change in the composition. The yellow above mentioned, indigo, and ceruse, or Spanish white, are the new ingredients which must be employed.

To make blue colours.

Blue belongs to the order of vegetable substances, like indigo; or to that of metallic substances, like Prusian blue; or to that of stony mineral substances as ultra marine; or to that of vitreous substances coloured by a metallic oxide, as Saxon blue. Ultra marine is more particularly reserved for pictures. The same may, in some degree, be said of Saxon blue.

When prussiate of iron or indigo is employed without mixture, the colour produced is too dark. It has no splendour, and very often the light makes it appear black; it is, therefore, usual to soften it with white.

To make blue distemper.

Grind with water as much ceruse as may be thought necessary for the whole of the intended work; and afterwards mix it with indigo, or Prussian blue.

This colour produces very little effect in distemper, but it is not very favourable to the play of the light; but it soon acquires brilliancy and splendour beneath the vitreous lamina of the varnish. Painting in distemper, when carefully varnished, produces a fine effect.

To make Prussian blue paint.

The ceruse is ground with oil, if for varnish made with essence, or merely with essence, which is equally proper for oil painting; and a quantity of either of these blues sufficient to produce the required tone is added.

For varnish, the ceruse is generally ground with oil of pinks added to a little essence, and is mixed up with camphorated mastic varnish, if the colourr is destined for delicate objects; or with gallipot varnish if for wainscotting. This colour, when ground and mixed up with drying oil, produces a fine effect, if covered by a solid varnish made with alcohol or essence.

If this oil colour be destined for expensive articles, such as valuable furniture subject to friction, it may be glazed with the turpentine copal varnish.

To make saxon blue.

Saxon blue, a vitreous matter coloured by oxide of cobalt, gives a tone of colour different from that of the prussiate of iron and indigo. It is employed for sky-blues. The case is the same with blue verditer, a preparation made from oxide of copper and lime. Both these blues stand well in distemper, in varnish, and in oil.

Saxon blue requires to be ground with drying oil, and to be mixed with gallipot varnish. If intended for oil painting, it is to be mixed up with resinous drying oil, which gives body to this vitreous matter.

To make blue verditer.

This may be ground with pure alcoholic varnish added to a little essence; and may be mixed up with compound mastic varnish if the colour is to be applied to delicate articles. Or mastic gallipot varnish added to a little drying oil, may be used for grinding, and common gallipot varnish for mixing up, if the painting is intended for ceilings, wainscotting, &c. This colour is soft and dull, and requires a varnish to heighten the tone of it, and give it play. Turpentine copal varnish is proper for this purpose, if the article has need of a durable varnish.

To make green colour.

Every green colour, simple or compound, when mixed up with a white ground, becomes soft, and gives a sea-green, of greater or less strength, and more or less delicate, in the ratio of the respective quantities of the principal colours. Thus, green oxides of copper, such as mountain green, verdigris, dry crystallized acetate of copper, green composed with blue verditer, and the Dutch pink of Troyes, or any other yellow, will form, with a base of a white colour, a sea green, the intensity of which may be easily changed or modified. The white ground for painting in distemper is generally composed of Bougival white (white marl,) or white of Troyes (chalk,) or Spanish white, (pure clay;) but for varnish or oil painting, it is sought for in a metallic oxide. In this case, ceruse or pure white oxide of lead is employed.

To make sea green for distemper.

Grind separately with water, mountain green and ceruse; and mix up with parchment size and water, adding ceruse in sufficient quantity to produce the degree of intensity required in the colour. Watin recommends the use of Dutch pink of Troyes and white oxide of lead, in proportions pointed out by experience; because the colour thence resulting is more durable.

In the case of a triple composition, begin to make the green by mixing Dutch pink with blue verditer, and then lower the colour to sea green, by the addition of ceruse ground with water.

To make sea green for varnish and oils.

Varnish requires that this colour should possess more body than it has in distemper; and this it acquires from the oil which is mixed with it. This addition even gives it more splendour. Besides, a green of a metallic nature is substituted for the green of the Dutch pink, which is of a vegetable nature.

A certain quantity of verdigris, pounded and sifted through a silk sieve, is ground separately with nut oil, half drying and half fat; and if the colour is intended for metallic surfaces, it must be diluted with camphorated mastic, or gallipot varnish.

On the other hand, the ceruse is ground with essence, or with oils to which one half of essence has been added, and the two colours are mixed in proportions relative to the degree of intensity intended to be given to the mixture. It may readily be conceived that the principal part of this composition consists of ceruse.

If this colour be destined for articles of a certain value, crystallized verdigris, dried and pulverized, ought to be substituted for common verdigris, and the painting must be covered with a stratum of the transparent or turpentine copal varnish.

The sea-greens, which admit into their composition metallic colouring parts, are durable, and do not change.

The last compositions may be employed for sea-green in oil painting: but it will be proper to brighten the tone a little more than when varnish is used; because this colour becomes darker by the addition of yellow, which the oil developes in the course of time.

Green for doors, shutters, balustrades, and articles exposed to the air.

Ceruse is the principal base of this colour. When it is required to bring it to the tone most agreeable, grind, with nut-oil, two parts of ceruse, and with essence of turpentine one part of verdigris. Then mix up the two colours with one half of common drying nut-oil, and one half of resinous drying nut-oil. This colour appears at first to be a pale blue; but the impression of the light soon makes it pass to green, and in this state it is very durable.

The doses of the ceruse ought to be carried to a third more, when the colour is intended to be employed in the centre of large cities, without this precaution it acquires a gloomy tone, which leads to a blackish green. This effect arises from the thick atmosphere, and the exhalations which vitiate the air in large cities. In these cases white ought to be preferred to yellow, as the ground to a green colour. The custom among painters is to make the first coating yellow.

To make compound green for rooms.

Take two pounds of ceruse, four onces of Dutch pink of Troyes, and one ounce of Prussian blue or indigo. This mixture produces a green, the intensity of which may be increased or diminished by the addition of yellow or blue. Grind with oil, to which a fourth part of essence has been added, and mix up with camphorated mastic or gallipot varnish. Both these contribute to the durability of the colour. If it be required to destroy the smell of the turpentine, form a glazing with compound mastic varnish.

To make a green for articles exposed to friction, as wheels of carriages, &c.

The great wear to which carriages are exposed by friction and continual washing, requires that a durable varnish should be employed when they are painted. Whatever care may be taken by coachmen, it is impossible that continual rubbing with a mop or sponge, which becomes filled with earthy particles, should not produce an alteration in the best varnish. To render the work solid, first apply a ground composed of boiled linseed oil, ceruse previously dried over a pretty strong fire, to make it lose the white, and a little white vitriol, in a dose of a quarter of an ounce to each pound of matter. The second stratum must be composed of the preceding green colour, viz. two parts of ceruse, and one part of verdigris, pulverized and ground with boiled nut-oil, added to a fourth part of fat oil of pinks, and mixed up with drying oil. The third stratum consists of the same colour mixed up with camphorated copal varnish.

To make red for the bodies of carriages.

Artists differ in regard to the composition of the first strata. Matin recommends red de Berri, (a kind of argillaceous ochre, mixed with litharge.) Others prefer red oxide of lead. Either of these substances may be employed, as the artist finds most convenient. Take one-third of these bases for the first stratum, adding a little litharge, ground on porphyry, if red de Berri be used. Grind with oil, half fat and half drying, and mix up with drying oil. The second stratum should be red oxide of lead, ground with drying oil, added to one half of essence. The third ought to be composed in the same manner, but with vermilion. Now glaze the whole with fat copal varnish, heightened with a little vermilion, and hasten the desiccation of the varnish by exposure to the sun, or to a strong current of air.

The red is often prepared, from motives of economy, with red oxide of lead, without vermilion.

To paint in varnish on wood.

Lay on the wood two coats of Troyes white, diluted with size water. Next, lay over these a third coat of ceruse, then mix the colour wanted with turpentine oil; add the varnish to it, and lay it on the wood, previously prepared as follows:—

Polish the wood first with shave-grass or horse-tail, and then with pounce-stone. Lay afterwards six or seven coats of colour, mixed with varnish, allowing after each coat, a sufficient time to dry, before laying on the next; then polish over the last coat with pounce-stone, ground on marble into a subtle powder. When this is done, lay two or three coats of pure white varnish. As soon as this is dry, rub it over with a soft rag, dipped in fine olive oil; then rub it with tripoli, reduced to subtle powder, and having wiped it with a clean piece of linen, pass a piece of wash leather all over it.

To make red for cuffets.

Varnish with vermilion is not confined merely to the wheels and bodies of carriages; it often forms the ground; and in this case it ought to be treated in the same manner. It requires, however, a little more labour. After the first stratum is applied, it is rubbed with pumice-stone; the varnish is then laid on, at several times, and polished. Grind with boiled oil, added to essence, red oxide of lead, and mix up with gallipot varnish. The second stratum is formed of vermilion heightened with a small particle of Naples yellow. Then apply a third stratum of the varnish of the second, a little charged with vermilion. This varnish is very durable, and is susceptible of a fine polish.

To make bright red.

A mixture of lake with vermilion gives that beautiful bright red which painters employ for the sanguine parts. This red is sometimes imitated for varnishing small appendages of the toilette. It ought to be ground with varnish, and mixed up with the same, after which it is glazed and polished. The mastic gallipot varnish is used for grinding; gallipot varnish for mixing up; and camphorated mastic varnish for glazing.

To make crimson, or rose colour.

Carminated lake, that which is composed of alum, charged with the colouring part of cochineal, ceruse, and carmine, forms a beautiful crimson. It requires a particle of vermilion and of white lead.

The use of this varnish is confined to valuable articles.

To make violet colour.

Violet is made indifferently with red and black, or red and blue; and to render it more splendid, with red, white, and blue. To compose violet, therefore, applicable to varnish, take minium, or what is still better, vermilion, and grind it with the camphorated mastic varnish, to which a fourth part of boiled oil, and a little ceruse have been added: then add a little Prussian blue, ground in oil. The proportions requisite for the degree of intensity to be given to the colour will soon be found by experience. The white brightens the tint. The vermilion and Prussian blue, separate or mixed, give hard tones, which must be softened by an intermediate substance, that modifies, to their advantage, the reflections of the light.

To make chesnut colour.

This colour is composed of red, yellow, and black. The English red, or red ochre of Auvergne, ochre de rue, and a little black, form a dark chesnut colour. It is proper for painting of every kind. If English red, which is drier than that of Auvergne, be employed, it will be proper, when the colour is intended for varnish, to grind it with drying nut oil. The ochre of Auvergne may be ground with the mastic gallipot, and mixed up with gallipot varnish.

The most experienced artists grind dark colours with linseed oil, when the situation will admit of its being used, because it is more drying. For articles without doors nut oil is preferable. The colours of oak-wood, walnut-tree, chesnut, olive, and yellow, require the addition of a little litharge ground on porphyry; it hastens the desiccation of the colour, and gives it body.

But if it is intended to cover these colours with varnish, as is generally done in wainscotting, they must be mixed up with essence, to which a little oil has been added. The colour is then much better disposed to receive the varnish, under which it exhibits all the splendour it can derive from the reflection of the light.

To make a drier for painting.

Vitreous oxide of lead (litharge,) is of no other use in painting than to free oils from their greasy particles, for the purpose of communicating to them a drying quality. Red litharge, however, ought to be preferred to the greenish yellow: it is not so hard, and answers better for the purpose to which it is destined.

When painters wish to obtain a common colour of the ochrey kind, and have no boiled oil by them, they may paint with linseed oil, not freed from its greasy particles, by mixing with the colour about two or three parts of litharge, ground on a piece of porphyry with water, dried and reduced to fine powder, for 16 parts of oil. The colour has a great deal of body, and dries as speedily as if mixed with drying oil.

To make cheap beautiful green paint.

The cost of this paint is less than one-fourth of oil colour, and the beauty far superior. Take 4 lbs. of Roman vitriol, and pour on it a tea-kettle full of boiling water; when dissolved, add 2 lbs. of pearl ash, and stir the mixture well with a stick, until the effervescence cease: then add a quarter of a pound of pulverized yellow arsenic, and stir the whole together. Lay it on with a paint brush, and if the wall has not been painted before, two, or even three coats will be requisite. To paint a common sized room with this colour, will not cost more than 5 or 6 dollars. If a pea-green is required put in less, and if an apple-green more, of the yellow arsenic.

To paint in fresco.

It is performed with water-colours on fresh plaster; or a wall laid with mortar not dry. This sort of painting has a great advantage by its incorporating with the mortar, and, drying along with it, becomes very durable.

The ancients painted on stucco; and we may remark in Vitruvius, what infinite care they took in making the plastering of their buildings, to render them beautiful and lasting; though the modern painters find a plaster of lime and sand preferable to it.

To paint fire places and hearths.

The genevese employ a kind of stone, known under the name of *molasse*, for constructing fire-places and stoves, after the German manner. This stone is brought from Saura, a village of Savoy, near Geneva. It has a greyish colour, inclining to blue, which is very agreeable to the eye. This tint is similar to that communicated to common white-washing with lime, chalk, or gypsum, the dulness of which is corrected by a particle of blue extract of indigo, or by charcoal black.

To make red distemper for tiles.

Dip a brush in water from a common ley, or in soapy water, or in water charged with a 20th part of the carbonate of potash (alkali of potash,) and draw it over the tiles. This washing thoroughly cleanses them, and disposes all the parts of the pavement to receive the distemper.

When dry, dissolve in eight pints of water half a pound of Flanders glue; and while the mixture is boiling, add two pounds of red ochre; mix the whole with great care. Then apply a stratum of this mixture to the pavement, and when dry apply a second stratum with drying linseed oil, and a third with the same red, mixed up with size. When the whole is dry, rub it with wax.

To distemper in badigeon.

Badigeon is employed for giving an uniform tint to houses rendered brown by time, and to churches. Badigeon, in general, has a yellow tint. That which succeeds best is composed of the saw-dust or powder of the same kind of stone, and slaked lime, mixed up in a bucket of water, holding in solution a pound of the sulphate of alumine, (alum.) It is applied with a brush.

At Paris, and in other parts of France, where the large edifices are constructed of a soft kind of stone, which is yellow, and sometimes white, when it comes from the quarry, but which in time becomes brown, a little ochre de rue is substituted for the powder of the stone itself, and restores to the edifice its original tint.

To make red lead.

Fuse a quantity of lead upon a hearth, and work it about with an iron wet, till the calx acquires a yellow colour. Then grind it small with water at a mill, constructed for the purpose: and well wash it to deprive it of small lumps, which may remain uncalcined. Put this masicot, well dried, into stone pots, which are placed horizontally in the colour furnace, fill them something more than a quarter full, and heat them till they acquire a red colour; place a brick at the mouth of each pot to confine the heat; but remove it occasionally to work the matter about. By continuing this heat a sufficient time, the colour will become finer till the minium is perfect.

Red lead from lead, and also from litharge, is not so good as the former, on account of the scoria of other substances mixed with the litharge. The makers of flint-glass, who use much red lead in their glass, find that it does not flux so well as that made from the direct oxidation of the metal, as practised in the county of Derby. Those furnaces are like a baker's oven, with a low vaulted roof, and two party-walls, rising from their floor, which leave a middle space, where the pit-coal is burned: the flame being drawn over the party-walls, strikes on the roof, and is thence reflected on each side, by which the lead there is kept melted. The surface of lead, by its exposition to air, becomes instantly covered with a dusky pelicle, which is successively removed: the greater part of the metal is thus converted into a yellowish-green powder, which is afterwards ground fine in a mill, and washed; the heterogeneous particles of lead, still remaining, are separated by passing the wash through sieves; the yellow colour becomes uniform, and is called massicot, by the painters. The yellow oxide, well dried, is thrown again into the furnace, where it is constantly stirred in continual heat; so that in about 48 hours, this oxide acquires a vivid red, inclining to orange colour, and is known by the name of minium, or red lead.

The read lead made in France is of a considerably worse quality than what is made in England or Holland. A ton of lead generally gives twenty-two hundred weight of minium. It is said, that at Nuremburg the increased weight of red lead amounts to one-fifth of the metal; this may probably depend on the method employed, as Watson thinks. Neumann says, that the best Venetian minium is made from ceruse, or white lead.

To make a composition, for rendering canvas, linen, and cloth, durable, pliable, and water-proof.

To make it black.

First, tho canvass, linen, or cloth, is to be washed with hot or cold water, the former preferable, so as to discharge the stiffening which all new canvas, linen, or cloth contains; when the stiffening is perfectly discharged hang the canvas, linen, or cloth up to dry; when perfectly so, it must be constantly rubbed by the hand until it becomes supple; it must then be stretched in a hollow frame very tight, and the following ingredients are to be laid on with a brush for the first coat, viz. eight quarts of boiled linseed oil, half an ounce of burnt umber, a quarter of an ounce of sugar of lead, a quarter of an ounce of white vitriol, a quarter of an ounce of white lead.

The above ingredients, except the white lead, must be ground fine with a small quantity of the above-mentioned oil, on a stone and muller; then mix all the ingredients up with the oil, and add 3 oz. of lamp-black, which must be put over a slow fire in an iron broad vessel, and kept stirred until the grease disappears. In consequence of the canvas being washed and then rubbed, it will appear rough and nappy; the following method must be taken with the second coat, viz. the same ingredients as before, except the white lead; this coat will set in a few hours, according to the weather; when set, take a dry paint-brush and work it very hard with the grain of the canvass; this will cause the nap to lie smooth.

The third and last coat, makes a complete jet-black, which continues its colour:—take three gallons of boiled linseed oil, an ounce of burnt umber, half an ounce of sugar of lead, a quarter of an ounce of white vitriol, half an ounce of Prussian blue, and a quarter of an oz. of verdigris; this must be all ground very fine in a small quantity of the above oil, then add four ounces of lamp black, put through the same process of fire as the first coat. The above are to be laid on and used at discretion, in a similar way to paint. To make lead colour, the same ingredients as before in making the black with the addition of white lead, in proportion to the colour you wish to have, light or dark.

To make it green.

Yellow ochre, four ounces, Prussian blue, three quarters of an ounce, white lead, three ounces, white vitriol, half an ounce, sugar of lead, a quarter of an ounce, good boiled linseed oil sufficient to make it of a thin quality, so as to go through the canvas.

To make it yellow.

Yellow ochre, four ounces, burnt umber, a quarter of an ounce, white lead, six or seven ounces, white vitriol, a quarter of an ounce, sugar of lead, a quarter of an ounce, boiled linseed oil, as in green.

To make it red.

Red lead, four ounces, vermillion, two ounces, white vitriol, a quarter of an ounce, sugar of lead, a quarter of an ounce, boiled linseed oil as before.

To make it grey.

Take white lead, a little Prussian blue, according to the quality you want, which will turn it to a grey colour; a proportion of sugar of lead and white vitriol, as mentioned in the other colours; boiled linseed oil sufficient to make it of a thin quality.

To make it white.

White lead, four pounds, spirits of turpentine, a quarter of a pint, white vitriol, half an ounce, sugar of lead half an ounce, boiled oil, sufficient to make it of a thin quality..

The above ingredients, of different colours, are calculated as near as possible; but as one article may be stronger than another, which will soon be discovered in using, in that case the person working the colour may add a little, or diminish, as he may find necessary.

The same preparation for wood or iron, only reducing the oil about three quarts out of eight, and to be applied in the same manner as paint or varnish, with a brush.

ARTISTS' OIL COLOURS.

On colouring materials.

The composition of colours as respects those leading tests of excellence, preservation of general tints, and permanency of brilliant hues, during their exposure for many centuries to the impairing assaults of the atmosphere, is a preparation in which the ancient preparers of these oily compounds, have very much excelled, in their skilfulness, the moderns. It is a fact, that the ancient painted walls, to be seen at Dendaras, which although exposed for many ages to the open air, without any covering or protection, still possess a perfect brilliancy of colour, as vivid as when painted, perhaps, 2000 years ago. The Egyptian mixed their colours with some gummy substance, and applied them detached from each other, without any blending or mixture. They appear to have used six colours, viz. white, black, blue, red, yellow, and green; they first covered the canvas entirely with white, upon which they traced the design in black, leaving out the lights of the ground colour. They used minium for red, and generally of a dark tinge. Pliny mentions some painted ceilings in his day in the town of Ardea, which had been executed at a date prior to the foundation of Rome. He expresses great surprise and admiration at their freshness, after the lapse of so many centuries. These are, undoubtedly, evidences of the excellences of the ancients in their art of preparing colours. In the number of them, there is, probably, not much difference between the ancient and modern knowledge. The ancients seem to have been possessed of some colours of which we are ignorant, while they were unacquainted themselves, with some in those more recently discovered. The improvements of chemistry have, certainly, in later times, enriched painting with a profusion of tints; to which, in point of brilliancy at least, no combination of primitive colours known to the ancients could pretend, but the rapid fading in the colours of some of the most esteemed masters of the Modern School, proves, at least, there is something defective in their bases, or mode of preparing them. This fault is peculiarly evident in many of the productions from our esteemed master, Sir Joshua Reynolds, which, although they have not issued from his pallet more than 40 years, carry an impoverishment of surface, from the premature fading of their colours, so as almost to lose, in many instances, the identity of the subjects they represent. On this head, (and a most important one it is,) the superiority of the ancient compounders completely carries away the palm of merit.

To prepare ultramarine.

Separate from the stone the most apparent parts of the ultramarine; reduce them to the size of a pea, and, having brought them to a red heat in a crucible, throw them in that state, into the strongest distilled vinegar. Then grind them with the vinegar, and reduce them to an impalpable powder; next take of wax, red colophonium, and lapis lazuli, an equal quantity, say half an ounce of earth of these three substances; melt the wax and the colophonium in a proper vessel, and add the powder to the melted matter, then pour the mass into cold water, and let it rest eight days. Next take two glass vessels filled with water, as hot as the hand can bear, knead the mass in the water, and when that the purest part of the ultramarine has been extracted, remove the resinous mass into the other vessels, where finish the kneading to separate the remainder, if the latter portion appears to be much inferior, and paler than the former, let it rest for four days, to facilitate the precipitation of the ultramarine, which extract by decantation, and wash it in fair water.

Ultramarine of four qualities may be separated by this process. The first separation gives the finest, and as the operation is repeated, the beauty of the powder decreases.

Kinckel considers immersion in vinegar as the essential part of the operation. It facilitates the division, and even the solution of the zeolitic and earthy particles soluble in that acid.

Another method.

Separate the blue parts, and reduce them, on a piece of porphyry, to an impalpable powder, which besprinkle with linseed oil, then make a paste with equal parts of yellow wax, pine resin, and colophonium, say, eight ounces of each; and add to this paste, half an ounce of linseed oil, two ounces of oil of turpentine, and as much pure mastic.

Then take four parts of this mixture, and one of lapis lazuli, ground with oil on a piece of porphyry, mix the whole warm, and suffer it to digest for a month, at the end of which, knead the mixture thoroughly in warm water, till the blue part separates from it, and at the end of some days decant the liquor. This ultramarine is exceedingly beautiful.

These two processes are nearly similar, if we except the preliminary preparation of Kinckel, which consists in bringing the lapis lazuli to a red heat, and immersing it in vinegar. It may be readily seen, by the judicious observations of Morgraff on the nature of this colouring part, that this calcination may be hurtful to certain kinds of azure stone. This preliminary operation, however, is a test which ascertains the purity of the ultramarine.

To extract the remainder of ultramarine.

As this matter is valuable, some portions of ultramarine may be extracted from the paste which has been kneaded in water; nothing is necessary but to mix it with four times its weight of linseed oil; to pour the matter into a glass of conical form, and to expose the vessel in the balneum mariæ of an alembic. The water of which must be kept in a state of ebullition for several hours. The liquidity of the mixture allows the ultramarine to separate itself, and the supernatant oil is decanted. The same immersion of the colouring matter in oil is repeated, to separate the resinous parts which still adhere to it; and the operation is finished by boiling it in water to separate the oil. The deposit is ultramarine; but it is inferior to that separated by the first washing.

To ascertain whether ultramarine be adulterated.

As the price of ultramarine, which is already very high, may become more so on account of the difficulty of obtaining lapis lazuli, it is of great importance that painters should be able to detect adulteration. Ultramarine is pure if, when brought to a red heat in a crucible, it stands that trial without changing its colour: as small quantities only are subjected to this test, a comparison may be made, at very little expense, with the part which has not been exposed to the fire. If adulterated, it becomes blackish or paler.

This proof, however, may not always be conclusive. When ultramarine of the lowest quality is mixed with azure, it exhibits no more body than sand ground on porphyry would do; ultramarine treated with oil, assumes a crown tint.

Another method.

Ultramarine is extracted from lapis lazuli, or azure stone, a kind of heavy zeolite, which is so hard as to strike fire with steel, to cut glass, and to be susceptible of a fine polish. It is of a bright blue colour, variegated with white or yellow veins, enriched with small metallic glands and even veins of a gold colour, which are only sulphurets of iron (martial pyrites:) it breaks irregularly. The specimens most esteemed are those charged with the greatest quantity of blue.

Several artists have employed their ingenuity on processes capable of extracting ultramarine in its greatest purity: some, however, are contented with separating the uncoloured portions of the stone, reducing the coloured part to an impalpable powder, and then grinding it for a long time with oil of poppies. But it is certain that, in consequence of this ineffectual method, the beauty of the colour is injured by parts which are foreign to it: and that it does not produce the whole effect which ought to be expected from pure ultramarine.

It may be readily conceived that the eminent qualities of ultramarine must have induced those first acquainted with the processes proper for increasing the merit and value of it, to keep them a profound secret. This was indeed the case; ultramarine was prepared long before any account of the method of extracting and purifying it was known.

To make artificial Saxon blue.

Saxon blue may be successfully imitated, by mixing with a divided earth prussiate of iron, at the moment of its formation and precipitation.

Into a solution of 144 grains of sulphate of iron, pour a solution of prussiate of potash.

At the time of the formation of iron, add, in the same vessel, a solution of 2 ounces of alum, and pour in with it, the solution of potash, just sufficient to decompose the sulphate of alumine; for a dose of alkali superabundant to the decomposition of that salt might alter the prussiate of iron. It will, therefore, be much better to leave a little alum, which may afterwards be carried off by washing.

As soon as the alkaline liquor is added, the alumine precipitated becomes exactly mixed with the prussiate of iron, the intensity of which it lessens by bringing it to the tone of common Saxon blue. The matter is then thrown on a filter, and after being washed in clean water, is dried. This substance is a kind of blue verditer, the intensity of which may vary according to the greater or less quantity of the sulphate of alumine decomposed. It may be used for painting in distemper.

To compose blue verditer.

Dissolve the copper, cold, in nitric acid (acqua fortis,) and produce a precipitation of it by means of quick-lime, employed in such doses that it will be absorbed by the acid, in order that the precipitate may be pure copper, that is, without any mixture. When the liquor has been decanted, wash the precipitate, and spread it out on a piece of linen cloth to drain. If a portion of this precipitate, which is green, be placed on a grinding stone, and if a little quick-lime in powder be added, the green colour will be immediately changed into a beautiful blue. The proportion of the lime added is from seven to ten parts in a hundred. When the whole matter acquires the consistence of paste, desiccation soon takes place.

Blue verditer is proper for distemper, and for varnish; but it is not fit for oil painting, as the oil renders it very dark. If used, it ought to be brightened with a great deal of white.

To make Naples yellow.

Take 12 ounces of ceruse, 2 oz. of the sulphuret of antimony, half an oz. of calcined alum, 1 oz. of sal ammoniac.

Pulverize these ingredients, and having mixed them thoroughly, put them into a capsule or crucible of earth, and place over it a covering of the same substance. Expose it at first to a gentle heat, which must be gradually increased till the capsule is moderately red. The oxidation arising from this process requires, at least, three hours' exposure to heat before it is completed. The result of this calculation is Naples yellow, which is ground in water on a porphyry slab with an ivory spatula, as iron would alter the colour. The paste is then dried and preserved for use. It is a yellow oxide of lead and antimony.

There is no necessity of adhering so strictly to the doses as to prevent their being varied. If a golden colour be required in the yellow, the proportions of the sulphuret of antimony and muriate of ammoniac must be increased. In like manner, if you wish it to be more fusible, increase the quantities of sulphuret of antimony and calcined sulphate of alumine.

To make Montpellier yellow.

Take 4 pounds of litharge, well sifted, divide it into four equal portions, and put it into as many glazed earthen vessels. Dissolve also 1 pound of sea salt in about 4 pounds of water.

Pour a fourth part of this solution into each of the four earthen vessels, to form a light paste. Let the whole rest for some hours, and when the surface begins to grow white, stir the mass with a strong wooden spatula. Without this motion it would acquire too great hardness, and a part of the salt would escape decomposition.

As the consistence increases, dilute the matter with a new quantity of the solution; and if this is not sufficient, recourse must be had to simple water to maintain the same consistence. The paste will then be very white, and in the course of twenty-four hours becomes uniform and free from lumps; let it remain for the same space of time, but stir it at intervals to complete the decomposition of the salt. The paste is then well washed to carry off the caustic soda (soda deprived of carbonic acid) which adheres to it: and to extract the whole of it, the mass is put into strong linen cloth and subjected to a press.

The remaining paste is distributed in flat vessels; and these vessels are exposed to heat, in order to effect a proper oxidation (calcination,) which converts it into a solid, yellow, brilliant-matter, sometimes crystallized in transverse striæ.

This is Montpellier yellow, which may be applied to the same purposes as Naples yellow.

To prepare carmine.

This kind of fecula, so fertile in gradations of tone by the effect of mixtures, and so grateful to the eye in all its shades, so useful to the painter, and so agreeable to the delicate beauty, is only the colouring part of a kind of dried insect known under the name of cochineal.

A mixture of 36 grains of chosen seed, 18 grains of autour bark, and as much alum thrown into a decoction of 5 grains of pulverized cochineal, and 5 pounds of water, gives, at the end of from five to ten days, a red fecula, which when dried weighs from 40 to 48 grains. This fecula is carmine. The remaining decoction, which is still highly coloured, is reserved for the preparation of carminated lakes.

To prepare Dutch pink from woad.

Boil the stems of woad in alum water; and then mix the liquor with clay, marl, or chalk, which will become charged with the colour of the decoction. When the earthy matter has acquired consistence, form it into small cakes, and expose them to dry. It is under this form that the Dutch pinks are sold in the colour shops.

Dutch pink from yellow berries.

The small blackthorn produces a fruit which, when collected green, are called yellow berries. These seeds, when boiled in alum water, form a Dutch pink superior to the former. A certain quantity of clay, or marl, is mixed with the decoction, by which means, the colouring part of the berries unites with the earthy matter, and communicates to it a beautiful yellow colour.

Brownish yellow Dutch pink.

Boil for an hour in 12 pounds of water, 1 pound of yellow berries, 1-2 pound of the shavings of the wood of Barberry shrub, and 1 pound of wood ashes. The decoction is strained through a piece of linen cloth.

Pour into this mixture warm, and at different times, a solution of 2 pounds of the sulphate of alumine in 5 pounds of water; a slight effervescence will take place: and the sulphate being decomposed, the alumine, which is precipitated, will seize on the colouring part. The liquor must then be filtered through a piece of close linen, and the paste which remains on the cloth, when divided into square pieces, is exposed on boards to dry. This is brown Dutch pink, because the clay in it is pure. The intensity of the colour shews the quality of this pink, which is superior to that of the other compositions.

Dutch pink for oil painting.

By substituting for clay a substance which presents a mixture of that earth and metallic oxide, the result will be Dutch pink of a very superior kind.

Boil separately 1 pound of yellow berries, and 3 ounces of the sulphate of alumine in 12 pounds of water, which must be reduced to 4 pounds. Strain the decoction through a piece of linen, and squeeze it strongly. Then mix up with it 2 pounds of ceruse, finely ground on porphyry, and 1 pound of pulverized Spanish white. Evaporate the mixture till the mass acquire the consistence of a paste; and having formed it into small cakes, dry them in the shade.

When these cakes are dry, reduce them to powder, and mix them with a new decoction of yellow berries. By repeating this process a third time, a brown Dutch pink will be obtained.

In general the decoctions must be warm when mixed with the earth. They ought not to be long kept, as their colour is speedily altered by the fermentation; care must be taken also to use a wooden spatula for stirring the mixture.

When only one decoction of wood or yellow berries is employed to colour a given quantity of earth, the Dutch pink resulting from it is of a bright-yellow colour, and is easily mixed for use. When the colouring part of several decoctions is absorbed, the composition becomes brown, and is mixed with more difficulty, especially if the paste be argillaceous: for it is the property of this earth to unite with oily and resinous parts, adhere strongly to them, and incorporate with them. In the latter case, the artist must not be satisfied with mixing the colour: it ought to be ground; an an operation equally proper for every kind of Dutch pink, and even the softest, when destined for oil painting.

To make lake from Brazil wood.

Boil 4 oz. of the raspings of Brazil wood in 15 pints of pure water, till the liquor is reduced to 2 pints. It will be of a dark red colour, inclining to violet; but the addition of 4 or 5 oz. of alum will give it a hue inclining to rose-colour. When the liquor has been strained through a piece of linen cloth, if 4 oz. of the carbonate of soda be added with caution, on account of the effervescence which takes place, the colour, which by this addition is deprived of its mordant, will resume its former tint, and deposit a lake, which, when washed and properly dried, has an exceedingly rich and mellow violet-red colour.

Another.

If only one half of the dose of mineral alkali be employed for this precipitation, the tint of the lake becomes clearer: because the bath still retains the undecomposed aluminous mordant.

Another.

If the method employed for Dutch pinks be followed by mixing the aluminous decoction of Brazil wood with pure clay, such as Spanish white and white of Morat, and if the mixture be deposited on a filter to receive the necessary washing, a lake of a very bright dark rose-colour will be obtained from the driers.

Lakes from other colouring substances.

By the same processes a very beautiful lake may be extracted from a decoction of logwood. In general, lakes of all colours and of all the shades of these colours, may be extracted from substances which give up their colouring part to boiling water; because it is afterwards communicated by decomposition to the alumine precipitated from sulphate of alumine, by means of an alkali; or the tincture may be mixed with a pure and exceedingly white argillaceous substance, such as real Spanish white, or white of Morat.

To prepare rouge.

Carmine united to talc, in different proportions, forms rouge employed for the toilette. Talc is distinguished also by the name of Briancon chalk. It is a substance composed, in a great measure, of clay, combined naturally with silex.

Carmine, as well as carminated lakes, the colouring part of which is borrowed from cochineal, are the most esteemed of all the compositions of this kind, because their colouring part maintains itself without degradation. There are even cases where the addition of caustic ammonia, which alters so many colouring matters, is employed to heighten its colour. It is for this purpose that those *who colour prints* employ it.

Carminated lake from madder.

Boil 1 part of madder in from 12 to 15 pints of water, and continue the ebullition till it be reduced to about 2 lbs. Then strain the decoction through a piece of strong linen cloth, which must be well squeezed; and add to the decoction 4 oz. of alum. The tint will be a beautiful bright red, which the matter will retain if it be mixed with proper clay. In this case, expose the thick liquid which is thus produced, on a linen filter, and subject it to one washing, to remove the alum. The lake, when taken from the driers, will retain this bright primitive colour given by the alum.

Another method.

If in the process for making this lake, decomposition be employed, by mixing with the bath an alkaline liquor, the alum which is decomposed, deprives the bath of its mordant, and the lake obtained after the subsequent washings, appears of the colour of the madder bath, without any addition: it is of a reddish brown. In this operation 7 or 8 oz. of alum ought to be employed for each pound of madder.

This kind of lake is exceedingly fine, but a brighter red colour may be given to it, by mixing the washed precipitate with alum water, before drying.

Improvement on ditto.

If the aluminated madder bath be sharpened with acetate of lead, or with arseniate of potash, the operator still obtains, by the addition of carbonate of soda, a rose-coloured lake of greater or less strength.

To prepare a substitute for cochineal.

The insects of the feverfew, or mother wort (matricaria parthenium,) will produce a substance to replace cochineal, in fine scarlet dyes. To detach the insects from the plants, without bruising them, and thereby losing the colouring matter, put a quantity, as sixteen pounds of stalks, in a case nearly air-tight, and heat it in an oven, which will suffocate the insects. This quantity will yield above a drachm of dried insects. In an instance wherein a comparison was made with cochineal, two similar pieces of woolen cloth were passed through the common mordant bath of muriatic of tin, and then one of the pieces in a cochineal bath, and the other in a bath prepared with the mother-wort insects. The difference between the two dyes was scarcely perceptible, and they equally resisted the chemical re-agents. Nor were they destroyed by sulphuric acid, or oxygenated muriatic acid.

To make dark red.

Dragon's blood infused warm in varnish, gives reds, more or less dark, according to the quantity of the colouring resin which combines with the varnish. The artist, therefore, has it in his power to vary the tones at pleasure.

Though cochineal, in a state of division, gives to essence very little colour in comparison with that which it communicates to water, carmine may be introduced into the composition of varnish coloured by dragon's blood. The result will be a purple red, from which various shades may be easily formed.

To prepare violet.

A mixture of carminated varnish and dragon's blood, added to that coloured by prussiate of iron, produces violet.

To make a fine red lake.

Boil stick-lac in water, filter the decoction, and evaporate the clear liquor to dryness over a gentle fire. The occasion of this easy separation is, that the beautiful red colour here separated, adheres only slightly to the outsides of the sticks broken off the trees along with the gum lac, and readily communicates itself to boiling water. Some of this sticking matter also adhering to the gum itself, it is proper to boil the whole together; for the gum does not at all prejudice the colour, nor dissolve in boiling water; so that after this operation the gum is as fit for making sealing-wax as before, and for all other uses which do not require its colour.

To make a beautiful red lake.

Take any quantity of cochineal, on which pour twice its weight of alcohol, and as much distilled water. Infuse for some days near a gentle fire, and then filter. To the filtered liquor add a few drops of the solution of tin, and a fine red precipitate will be formed. Continue to add a little solution of tin every two hours, till the whole of the colouring matter is precipitated. Lastly, edulcorate the precipitate by washing it in a large quantity of distilled water, and then dry it.—*Monthly Magazine.*

To prepare Florentine lake.

The sediment of cochineal that remains in the bottom of the kettle in which carmine is made, may be boiled with about four quarts of water, and the red liquor left after the preparation of the carmine, mixed with it, and the whole precipitated with the solution of tin. The red precipitate must be frequently washed over with water. Exclusively of this, two ounces of fresh cochineal, and one of crystals of tartar, are to be boiled with a sufficient quantity of water, poured off clear, and precipitated with the solution of tin, and the precipitate washed. At the same time two pounds of alum are also to be dissolved in water, precipitated with a lixivium of potash, and the white earth repeatedly washed with boiling water. Finally, both precipitates are to be mixed together in their liquid state, put upon a filter and dried. For the preparation of a cheaper sort, instead of cochineal, one pound of Brazil wood may be employed in the preceding manner.

To make lake from madder.

Inclose two ounces troy of the finest Dutch madder in a bag of fine and strong calico, large enough to hold three or four times as much. Put it into a large marble or porcelain mortar, and pour on it a pint of clear soft water cold. Press the bag in every direction, and pound and rub it about with a pestle, as much as can be done without tearing it, and when the water is loaded with colour, pour it off. Repeat this process till the water comes off but slightly tinged, for which about five pints will be sufficient. Heat all the liquor in an earthen or silver vessel, till it is near boiling, and then pour it into a large basin, into which a troy ounce of alum, dissolved in a pint of boiling soft water, has been previously put: stir the mixture together, and while stirring, pour in gently about 1 1-2 ounces of a saturated solution of subcarbonate of potash, let it stand till cold, to settle; pour off the clear yellow liquor; add to the precipitate a quart of boiling soft water, stirring it well: and when cold, separate by filtration the lake, which should weigh half an ounce. Fresh madder root is superior to the dry.

To give various tones to lake.

A beautiful tone of violet, red, and even of purple red, may be communicated to the colouring part of cochineal, by adding to the coloured bath a solution of tin in nitro-muriatic acid. The effect will be greater, if, instead of this solution one of oxygenated muriate of tin be employed.

Another.

The addition of arseniate of potash (neutral arsenical salt,) gives shades which would be sought for in vain with sulphate of alumine (alum.)

To make a carminated lake by extracting the colouring part from scarlet cloth.

To prepare a carminated lake without employing cochineal in a direct manner, by extracting the colouring matter from any substance impregnated with it, such as the shearings of scarlet cloth.

Put into a kettle 1 pound of fine wood ashes, with 40 pounds of water, and subject the water to ebullition for a quarter of an hour: then filter the solution through a piece of linen cloth till the liquor passes through clear.

Place it on the fire; and having brought it to a state of ebullition, add 2 lbs. of the shearings or shreds of scarlet cloth, dyed with cochineal, which must be boiled till they become white; then filter the liquor again, and press the shreds to squeeze out all the colouring part.

Put the filtered liquor into a clean kettle, and place it over the fire. When it boils, pour in a solution of 10 or 12 ounces of alum in 2 pounds of filtered spring water. Stir the whole with a wooden spatula, till the froth that is formed is dissipated; and having mixed with it 2 lbs. of a strong decoction of Brazil wood, pour it upon a filter. Afterwards wash the sediment with spring water, and remove the cloth filter charged with it, to plaister dryers, or to a bed of dry bricks. The result of this operation will be a beautiful lake, but it has not the soft velvety appearance of that obtained by the first method. Besides, the colouring part of the Brazil wood which unites to that of the cochineal in the shreds of scarlet cloth, lessens in a relative proportion the unalterability of the colouring part of the cochineal. For this reason purified potash ought to be substituted for the wood ashes.

To make a red lake.

Dissolve 1 lb. of the best pearl ashes in two quarts of water, and filter the liquor through paper: next add two more quarts of water and a pound of clean scarlet shreds, boil them in a pewter boiler till the shreds have lost their scarlet colour; take out the shreds and press them, and put the coloured water yielded by them to the other: In the same solution boil another pound of the shreds proceeding in the same manner: and likewise a third and fourth pound. Whilst this is doing, dissolve a pound and a half of cuttle-fish bone in a pound of strong aqua fortis in a glass receiver; add more of the bone if it appear to produce any ebullition in the aqua fortis; and pour this strained solution gradually into the other; but if any ebullition be occasioned, more of the cuttle-fish bone must be dissolved as before, and added till no ebullition appears in the mixture. The crimson sediment deposited by this liquor is the lake: pour off the water; and stir the lake in two gallons of hard spring water, and mix the sediment in two gallons of fresh water; let this method be repeated four or five times. If no hard water can be procured, or the lake appears too purple, half an ounce of alum should be added to each quantity of water before it be used. Having thus sufficiently freed the latter from the salts, drain off the water through a filter, covered with a worn linen cloth. When it has been drained to a proper dryness, let it be dropped through a proper funnel on clean boards, and the drops will become small cones or pyramids, in which form the lake must be dried; and the preparation is completed.

Another method.

Boil two ounces of cochineal in a pint of water, filter the solution through paper, and add two ounces of pearl-ashes, dissolved in half a pint of warm water, and filtered through paper. Make a solution of cuttle-bone as in the former process; and to a pint of it add two ounces of alum dissolved in half a pint of water. Put this mixture gradually to the cochineal and pearl-ashes, as long as any ebullition arises, and proceed as above.

A beautiful lake may be prepared from Brazil wood, by boiling three pounds of it for an hour in a solution of three pounds of common salt in three gallons of water, and filtering the hot fluid through paper; add to this a solution of five pounds of alum in three gallons of water. Dissolve three pounds of the best pearl-ashes in a gallon and a half of water, and purify it by filtering; put this gradually to the other, till the whole of the colour appear to be precipitated, and the fluid be left clear and colourless. But if any appearance of purple be seen, add a fresh quantity of the solution of alum by degrees, till a scarlet hue be produced. Then pursue the directions given in the first process with regard to the sediment. If half a pound of seed lac be added to the solution of pearl-ashes, and dissolved in it before its purification by the filter, and two pounds of the wood, and a proportional quantity of common salt and water be used in the coloured solution, a lake will be produced that will stand well in oil water, but is not so transparent in oil as without the seed lac. The lake with Brazil wood may be also made by adding half an ounce of annatto to each pound of the wood; but the annatto must be dissolved in the solution of pearl ashes.

After the operation, the driers of plaister, or the bricks, which have extracted the moisture from the precipitate, are exposed to the sun, that they may be fitted for another operation.

To make Prussian blue.

Previous to the making of this substance, an alkali must be prepared as follows: viz:—Fixed alkali must be burnt in ox's blood, or with horn shavings, or any other animal matter. The salt is now to be washed out. It is of an amber colour, and has the scent of peach blossoms.

A solution of martial vitriol, and another of alum, are put together in a large glass, and the alkaline ley poured upon them. A greenish precipitate is thrown down. The liquor is filtered in order to get the precipitate by itself, which is collected, and put into a glass cup. Upon pouring a little marine acid on this precipitate, it immediately acquires a fine blue colour. This part of the process is called the brightening.

Prussian blue may be made without alum, in the following manner:—Pour a little of the alkaline ley into a glass, drop in an acid till no farther effervescence ensues. Let a little of the solution of martial vitriol be poured into the ley, and a fine Prussian blue is formed that needs no brightening.

The common stone blues are Prussian blue, precipitated on large quantities of clay.

Another method.

A quantity of horns and hoofs are to be mixed with an equal weight of clippings of leather, and the whole submitted to distillation in a large iron retort fixed in a reverberatory furnace; the oil and impure ammonia, resulting from this process, are collected in a receiver, and the distillation is carried on at a high heat, till no fluid or vapour of any kind come over—the oil and alkali are disposed of to different manufacturers, and the black spongy coal remaining in the retort is the only part made use of in the preparation of the Prussian blue.

Ten pounds of this coal, and 30 pounds of common potash, are reduced together to a coarse powder, and heated to redness in an iron pot; by degrees the mass is brought into a state of semi-fusion, in which it is suffered to continue 12 hours, when the matter gives out a strong odour of sulphur; it is then taken out red hot, and thrown into a boiler of water, where it undergoes ebullition for about half an hour. The clear liquor is separated by filtration, and the residue is boiled in fresh parcels of water, till all the saline matter is extracted. These different lixivia are then mixed together. Four pounds of alum, and one and a half of sulphate of iron, are dissolved in warm water, and this solution is added to the former; a copious whitish precipitate is immediately deposited, which being collected and washed, acquires, by exposure to the air, a beautiful blue colour.

Another.

Boil 6 pounds of clippings of leather, 6 pounds of hoofs and horns, and 10 pounds of common potash, together in an iron pot to dryness; mix the residue with two pounds of crude tartar, and, by means of a strong fire, bring it into fusion. The lixiviation is conducted in the usual way, and a solution of 5 pounds of sulphate of iron, and 15 of alum being added, a precipitate takes place, which is the Prussian blue.

Another.

This colour is made in the following manner: two parts of purified potass are most intimately blended with three parts of dried finely pulverized bullock's blood.

The mass is first calcined in a covered crucible, on a moderate fire, until no smoke or flame appears; and it is after this brought to a complete yet moderate ignition: or, equal parts of potass and finely powdered coals, prepared from bones, horns, claws, &c. are mingled and heated in a covered crucible to a moderate redness. This done, either of these two calcined masses is, after cooling, lixiviated with boiling water, and the lixivium filtered. Now make a solution of one part of green vitriol and two parts of alum; and add to it, while yet hot, the above lixivium, little by little; and separate the greenish-blue precipitate, which then forms by means of a filter. If afterwards, a slight quantity of diluted muriatic acid is affused upon this precipitate, it assumes a beautiful dark blue colour. The operation is terminated by edulcorating and drying the pigment thus prepared.

To prepare a superb liquid blue.

Put into a small matrass or common phial an ounce of fine prussiate of iron (Prussian blue) reduced to powder, and pour over it from 1 1-2 oz. to 2 ounces of concentrated muriatic acid. The mixture produces an effervescence, and the prussiate soon assumes the consistence of thin paste. Leave it in this state for 24 hours; then dilute it with 8 or 9 ounces of water, and preserve the colour thus diluted in a bottle well stopped.

The intensity of this colour may be lessened, if necessary, by new doses of water. If the whole of this mixture be poured into a quart of water; it will still exhibit a colour sufficiently dark for washing prints.

This colour, charged with its mordant, requires the use of gum-water, made of gum tragacanth. Mucillage of gum arabic does not possess sufficient consistence.

This colour, applied with gum-water, and covered, when dry, with copal varnish, would form very beautiful foil.

To make blue verditer.

Into 100 pounds of whiting, pour the copper-water, and stir them together every day for some hours, till the water grows pale; then pour that away, set it by for other use, and pour on more of the green water, and so till the verditer be made; which, being taken out, is laid on large pieces of chalk in the sun, till it be dry and fit for market.

Another method.

Fully saturate the liquor which is used in parting with silver, which is precipitated by adding very pure copper. This nitrous solution of copper must be properly diluted with very pure water;—distilled is the best; and the copper precipitated on chalk properly prepared. The colour and chalk must be well mixed together and properly dried.

Another.

To a solution of nitrate of copper, add lime or lime-water, as long as any green precipitate falls down. Filter the solution, and dry the precipitate, which must be ground, and kept quite free from dust. The green colour will, by this time, be converted into a beautiful blue.

To make blue.

A diluted solution of sulphate of indigo.

To make pink.

Cochineal boiled with supertartrate of potash and sulphate alumine, or a decoction of Brazil wood with sulphate alumine; the colour may be varied by the addition of carbonate potash.

To make green.

The acetic copper (verdige) dissolved in acetous acid, forms an elegant green.

To make purple.

A decoction of Brazil wood and logwood affords, with carbonate of potash, a permanent purple.

To make orange lake.

Boil 4 ounces of the best annatto and 1 pound of pearl ashes, half an hour, in a gallon of watar, and strain the solution through paper. Mix gradually with this 1 1-2 lb. of alum, in another gallon of water, desisting when no ebullition attends the commixture. Treat the sediment in the manner already directed for other kinds of lake, and dry it in square bits or lozenges.

To make a yellow lake.

Take a pound of turmeric root, in fine powder, 3 pints of water, and an ounce of salt of tartar; put all into a glazed earthen vessel, and boil them together over a clear gentle fire, till the water appears highly impregnated and stains a paper to a beautiful yellow. Filter this liquor, and gradually add to it a strong solution of roche alum, in water, till the yellow matter is all curded and precipitated. After this, pour the whole into a filter of paper, and the water will run off, and leave the yellow matter behind. Wash it with fresh water, till the water comes off insipid, and then is obtained the beautiful yellow called *lacque of turmeric.*

In this manner make a lake of any of the substances that are of a strong texture as madder, logwood, &c. but it will not succeed in the more tender species, as the flowers of roses, violets, &c. as it destroys the nice arrangement of parts in those subjects, on which the colour depends.

To make another yellow lake.

Make a ley of potashes and lime sufficiently strong; in this boil, gently, fresh broom-flowers, till they are white; then take out the flowers, and put the ley to boil in earthen vessels over the fire: add as much alum as the liquor will dissolve: then empty this ley into a vessel of clean water, and it will give a yellow colour at the bottom. Settle, and decant off the clear liquor. Wash this powder, which is found at the bottom, with more water, till all the salts of the ley are washed off; then separate the yellow matter, and dry it in the shade.

To make a yellow.

Gum guttæ and terra merita give very beautiful yellows, and readily communicate their colour to copal varnish, made with turpentine. Aloes give a varied and orange tint.

Lemon yellow.

A beautiful lemon yellow may be formed by following the prescription of the old painters, who mixed together the oxides of arsenic, (realgar and orpiment.) But these colours, which may be imitated in another manner, have the disadvantage of being of a poisonous quality. It will, therefore, be better to substitute in their room, Dutch pink of Troyes and Naples yellow. This composition is proper for distemper and for varnish. When ground, and mixed with the varnishes indicated for the preceding colour, the result will be a bright solid colour, without smell, if an alcoholic varnish be applied for the last stratum.

To make Naples yellow.

There are two processes given for making this colour. 1st. One pound of antimony, 1 1-2 pound of lead, 1 oz. of alum, and 1 oz. of common salt.

2d. 1 1-2 oz. of pure ceruse, 2 oz. of diaphoretic antimony, 1-2 oz. of calcined alum, and 1 oz. of pure sal ammoniac. The ingredients are to be well mixed together, and calcined in a moderate heat for 3 hours, in a covered crucible, till it becomes barely red hot, when the mass will become of a beautiful yellow colour. With a larger portion of calx of antimony and sal ammoniac, the yellow verges towards gold colour.

Glass may be tinged yellow with the above preparation.

To make a patent yellow.

It is prepared by triturating minium or red oxide of lead and common salt together, and then exposing them in a crucible to a gentle heat. In this process, the salt is decomposed, and the acid unites with the oxide of lead, and forms the patent yellow. The alkaline base of the salt remains in the compound, which is to be carefully washed and crystallized.

Muriate of lead tinges vitreous matters of a yellow colour. Hence the beautiful glazing given to Queen's ware. It is composed of 80 pounds of muriate of lead, and 20 pounds of flints ground together very fine, and mixed with water, till the whole becomes as thick as cream. The vessels to be glazed are dipped in the glaze, and suffered to dry, when they are exposed to a sufficient degree of heat to vitrify the surface.

To make Chinese yellow.

The Acacia, an Egyptian thorn, is a species of mimosa, from which the Chinese make that yellow which bears washing in their silks and stuffs, and appears with so much elegance in their painting on paper. The flowers are gathered before they are fully opened, and put into an earthen vessel over a gentle heat, being stirred continually until they are nearly dry, and of a yellow colour: then to half a pound of the flowers, a sufficient quantity of rain-water is added, to hold the flowers incorporated together. It is then to be boiled until it becomes thick, when it must be strained. To the liquor is added, half an ounce of common alum, and 1 ounce of calcined oyster-shells, reduced to a fine powder. All these are mixed together into a mass. An addition of a proportion of the ripe seeds to the flowers, renders the colours somewhat deeper. For making the depest yellow, add a small quantity of Brazil wood.

To make a pearl white.

Pour some distilled water into a solution of nitrate of bismuth, as long as precipitation takes place: filter the solution, and wash the precipitate with distilled water as it lies on the filter. When properly dried, by a gentle heat, this powder is what is generally termed pearl white.

To make a green colour.

Mix a solution of common salt and blue vitriol in water, by putting copper plates therein, and a green precipitate will be gradually formed.

To make Scheele's green.

Dissolve 2 pounds of blue vitriol in 6 pounds of water, in a copper vessel; and in another vessel, dissolve 2 pounds of dry white potash, and 11 ounces of white arsenic, in 2 pounds of water. When the solutions are perfect, pour the arsenca ley into the other gradually, and about 1 pound 6 ounces of good green precipitate will be obtained.

Brunswick green.

This is obtained from the solution of a precipitate of copper in tartar and water, which, by evaporation, yields a transparent cupreous tartar, which is similar to the superfine Brunswick green.

New green colour.

Dissolve in a small quantity of hot water, 6 parts of sulphate of copper; in another part, boil 6 parts of oxide of arsenic with 8 parts of potash, until it throws out no more carbonic acid: mix by degrees, this hot solution with the first, agitating continually until the effervescence has entirely ceased; these then form a precipitate of a dirty greenish yellow, very abundant; add to it about three parts of acetic acid, or such a quantity that there may be a slight excess perceptible to the smell after the mixture: by degrees the precipitate diminishes the bulk, and in a few hours there deposes spontaneously at the bottom of the liqour, en-entirely discoloured, a powder of a contexture slightly crystalline, and of a very beautiful green; afterwards the floating liquor is separated.

This process has been repeated on a large scale by using arsenic potass which was prepared with 8 parts oxid of arsenic in place of 6. The liquors were concentrated: some hours after the mixture there was formed at the surface a pellicle of a superb green colour; the whole was exposed to heat, and a heavy powder precipitated which was washed, to free it from a great excess of arsenic. The green thus obtained was magnifique.—*Annals de Chimie, Sept.* 1822.

To improve green paint.

Take 14 ounces of crude potash, 14 drachms of crude white arsenic.

Boil them in 2 gallons of soft water, until quite dissolved: then put the liquor into a cast iron vessel to coat and settle; draw off the liquor clean from the sediment, and put it into a vessel that will hold 200 gallons: add to it six gallons of clean soft water, cold: take one one pound of Roman vitriol, and boil it in two gallons of soft water till dissolved; putting the solution into an open vessel till quite cold; then add it gradually to the aforesaid solution of fixed alkali, stirring it well all the time, and it will produce a *genuine green oxide*, with which proceed in the usual way of mineral green. It is essentil in this preparation to make the mineral green without using caustic alkali which is the general way of manufacturing it for this purpose; because the caustic alkali acts powerfully on the vegetable quality of linseed oil used in this operation, and renders it mucilaginous.

To prepare the precipitate of copper to mix with the aforesaid oxide, take one pound of Roman vitriol, and boil it till dissolved in two gallons of soft water; at the same time dissolve in another vessel half a pound of the first soft American pearl-ash; put the solution of vitriol boiling hot, into a vessel that will hold 10 or 12 gallons; then add to it gradually the solution of pearl-ash, boiling hot: to be well stirred all the time. On mixing the solution together, it will cause a strong effervescence; if the pearl-ash is good, it will be enough to precipitate the vitriol, which will be known by the effervescence immediately subsiding, and the precipitate falling to the bottom of the vessel and thereby producing a fine green colour; when settled, draw off the clear liquor, then put it into bags, made of canvas, to filter, and when well drained lay it on chalk-stones, to draw a further quantity from it; then put it into a stove to dry.

To mix the mineral substances in linseed oil.

Take 1 lb. of the genuine mineral green, prepared and well powdered, 1 lb. of the precipitate of copper, 1 1-2 lb. of refiners' blue verditer, 3 lbs. of white lead, dry powdered, 3 ounces of sugar of lead, powdered fine.

Mix the whole of these ingredients in linseed oil, and grind them in a levigating mill, passing it through until quite fine; it will thereby produce a bright mineral pea green paint, preserve a blue tint, and keep any length of time, in any climate, without injury, by putting oil or water over it.

To use this colour for house or ship painting, take one pound of the green colour paint, with one gill of pale boiled oil; mix them well together, and this will produce a strong pea-green paint: the tint may be varied at pleasure, by adding a further quantity of white lead, ground in linseed oil. This colour will stand the weather, and resist salt water; it may also be used for flatting rooms, by adding three pounds of white lead, ground in half linseed oil, and half turpentine, to one ponnd of the green; then to be mixed up in turpentine spirits, fit for use. It may also be used for painting Venetian window blinds, by adding to one pound of the green paint ten ounces of white lead, ground in turpentine; then to be mixed up with turpentine varnish for use. In all the aforesaid preparations it will retain a blue tint, which is very desirable. When used for blinds, a small quantity of Dutch pink may be put to the white lead if the colour is required of a yellow cast.—*Repertory*, 1814.

An excellent azure.

Take 2 oz. of quicksilver; sulphur, and ammoniac salt, of each half oz. Grind all together, and put the contents to digest in a matrass over a slow heat: increase the fire a little, and when an azured fume arises, take the matrass from the fire. When cool, these will make as beautiful an azure as ultra marine.

To make a fine brown pink.

Bruise, and boil in 3 quarts of water, 4 oz. of French berries, to the reduction of one half. Strain them through a cloth, and put in this juice a discretional quantity of whiting, pounded and sifted into a subtle powder, so as to make a thick paste, which put into small tied bags, and set it to dry on tiles.

When dry, use it with gum; and to render it finer, put in some gamboge.

To imitate flesh colour.

Mix a little white and yellow together; then add a little more red than yellow. These form an excellent imitation of the complexion.

A white for painters which may be preserved forever.

Put into a pan 3 quarts of linseed oil, with an equal quantity of brandy, and 4 quarts of the best double distilled vinegar, 3 dozen of whole new-laid eggs, 4 lbs. of mutton suet, chopped small: cover all with a lead plate, and lute it well. Lay this pan in the cellar for three weeks, then take skilfully the white off, and dry it. The dose of this composition is 6 ounces of white to every one of bismuth.

To clean pictures.

Take the picture out of the frame; lay a clean towel on it, for 10 or 14 days. Keep continually wetting it, until it has drawn out all the filthiness from the picture: pass some linseed oil over it, which has been a long time seasoned in the sun to purify it, and the picture will become as lively on its surface as new.

Another method.

Put into 2 quarts of the oldest ley, a quarter of a pound of Genoa soap, rasped very fine, with about a pint of spirit of wine, and boil all together. Then strain it through a cloth, and let it cool. With a brush dipped in the composition rub the picture all over, and let it dry; repeat this process, and let it dry again. Then dip a little cotton in oil of nut, and pass it over its surface. When perfectly dry, rub it well over with a warm cloth, and it will appear of a beautiful freshness.

Compound for receiving the colours used in encaustic painting.

Dissolve 9 oz. of gum arabic in 1 pint of water; add 14 oz. of finely powdered mastic, and 10 oz. of white wax, cut in small pieces; and, whilst hot, add by degrees, 2 pints of cold spring water: then strain the composition.

Another method.

Mix 24 oz. of mastic with gum water, leaving out the wax; and when sufficiently beaten and dissolved over the fire, add, by degrees, 1 1-2 pints of cold water, and strain.

Or dissolve 9 ounces of gum arabic in 1 1-2 pints of water, then add 1 pound of white wax. Boil them over a slow fire, pour them into a cold vessel, and beat it well together. When this is mixed with the colours, it will require more water than the others. This is used in painting, the colours being mixed with these compositions as with oil, adding water if necessary. When the painting is finished, melt some white wax, and with a hard brush varnish the painting, and when cold, rub it to make it entirely smooth.

Grecian method of painting on wax.

Take an ounce of white wax, and one ounce of gum mastic, in drops, made into powder; put the wax into a glazed pan, over a slow fire, and when melted add the mastic; then stir the same until they are both incorporated. Next throw the paste into water, and when hard take it out, wipe it dry, and beat it in a mortar; when dry pound it in a linen cloth till it is reduced to a fine powder. Make some strong gum water, and when painting take a little of the powder, some colour, and mix them all with the gum water. Light colours require but a small quantity of the powder, but more must be put in proportion to the darkness of the colours, and to black there should be almost as much of the powder as of colour.

Having mixed the colours, paint with water as is practised in painting with water colours, a ground on the wood being first painted, of some proper colour, prepared as described for the picture. When the painting is quite dry, with a hard brush, passing it one way, varnish it with white wax, which is melted over a slow fire till the picture is varnished. Take care the wax does not boil. Afterwards hold the picture before a fire, near enough to melt the wax, but not to run; and when the varnish is entirely cold and hard, rub it gently with a linen cloth. Should the varnish blister, warm the picture again very slowly, and the bubbles will subside.

WATER COLOURS USED IN DRAWING.

Implements.

Those necessary for drawing are a drawing-board, a ruler, compasses, charcoal, black lead pencils, penknife, porte-crayons, black, white, and red chalks, Indian ink, crow-quill pens, camels' hair pencils, boxes of colours, paper of several sorts, and port-folios.

Drawing-boards are used to fix the paper so that it may not shift, and also to strain it, to prevent the colours when laid wet on the paper from causing it to swell, so as to become uneven. The simplest sort is made of a deal board framed, with a strong piece across each end to prevent warping. Upon this the paper may be fixed with pins, wafers, or sealing-wax, or it may be strained with paste or glue.

Drawing *compasses* are instruments of brass and steel, for dividing lines, and laying down measures from scales, &c.; a steel pen is also useful for drawing lines cleaner than they can be done by a common pen.

Black lead-pencils are either hard or soft, the best are without any grit, not too soft, and cut easily without breaking; those that are gritty and brittle will not answer so well.

Indian ink.—The best is stamped with Chinese characters, breaks with a glossy fracture, and feels smooth when rubbed on the shell or plate. The inferior kind, made in this country, may be easily known by its grittiness.

Hair pencils, are made of camels'-hair; if they come to a point, when moistened, without splitting, they are good.

Drawing paper.—That which is made without any wire marks, and called wove paper, is the best; it is made of various sizes and thicknesses. Middle tint paper is of a brownish or of a grey colour, and is used for drawing upon with black and white chalk.

Crow pens are used for fining the out-lines with ink after it has been determined by the pencil.

To draw in water colours.

This is an art capable of affording the highest delight; since no mode of representation can display the appearances of Nature with greater truth: it is an art which has of late been carried to an unprecedented success; and may be said, at present, to be the most perfect species of painting which is in practice. To this the facility of its materials mainly contributes.—It is not attended with the embarrassments to which oil painting is liable, but proceeds, by ready and uninterrupted progress, to its completion.

The general or simple colours, and the various species of each fit for painting in water colours, are as follow:—

Whites.—Ceruse, constant white, white lead, Spanish white, flake white, spodium.

Blacks.—Burnt cherry stones, ivory black, Keating's black, lamp black.

Greens.—Green bice, green verditer, grass green, sap green, verdigris distilled.

Blues.—Sanders' blue, terre blue, blue verditer, indigo, litmus, smelt, Prussian blue, light ditto, ultramarine, ultramarine ashes, blue bice.

Browns.—Spanish browns, Spanish brown, Spanish liquorice, umber, bistre, burnt terra de Sienna, unburnt ditto.

Reds.—Native cinnabar, burnt ochre, Indian red, red lead, minium, lake, vermilion, carmine, red ink, Indian lake.

Yellows.—English ochre, gall stone, gamboge, masticot, ochre de luce, orpiment, Roman ochre, Dutch pink, saffron water, king's yellow, gold yellow, French berries.

To prepare water colours.—White.

Use white lead, and clarify it with white wine vinegar; after the white is settled, pour off the vinegar, and wash it with water, thus: Put the powder into a glass of water, stir it, and presently pour the water off while it is white into another glass; when it is settled, pour off the water, and an excellent white will be obtained; to which add as much gum as is necessary to give it a gloss.

Another.

Take a pound of the shreddings of glove leather, and steep them in water; boil them with twelve quarts of water, till it wastes to two; strain it through a linen cloth, into a well glazed earthen pan; this is called glue or size, and proper to use with colours in candle light pieces; to know if this is strong enough, try if it is stiff and firm under the hand.

The glue being melted, reduce some white chalk to a powder, and while it is hot add such a quantity of the chalk as will bring it to the consistency of a paste, letting it steep for a quarter of an hour; stir it with a brush made of hogs' bristles.

In order to make this white brighter add more glue. Be careful to observe that every layer is dry before putting on another. If the artist works upon wood, he must put on a dozen; but six or seven are sufficient if the paper is thick. Afterwards dip a soft brush in some water, drain it with the fingers; rub the work with it in order to make it smooth. When the brush is full of white, wash it again; and also change the water when it is too white. Or use a wet linen rag instead of a brush.

Yellows.

In some objects there may frequently be seen a shining, like that of gold, through colours of red, blue, or green, such as some sorts of flies or beetles, and the cantharides. This may be well imitated by laying some leaf-gold on the shaded side of the drawing, giving a little to the light side. To lay on the gold-leaf, press it smooth and close with cotton, after having washed it with strong water; but take care that in laying on the gum, the limits are not exceeded through which the gold is to appear. In this case, the gold is only to shine through the transparent colour which is to be laid over it.

As leaf-gold will not receive water-colours regularly, procure some water of ox-gall, and with this liquor stroke over the gold leaf, by which it will receive any colour the artist is desirous of laying over it.

In some manuscripts there may be seen gold letters, which seem to rise above the surface of the paper. The composition which raises them is made of vermilion and the white of an egg, beaten to the consistence of an oil, and fixed to the paper with gum-arabic; on this figurative letter, wash some gum-water, with a camels'-hair pencil; lay on the gold-leaf close with some cotton; and when dry, rub it again with cotton, and burnish it with a dog's tooth, when it will appear as if cast in gold.

There is also another way of working in gold, which is performed by shell gold. Cover the shady parts with vermilion, before using this gold, and when it has been rectified with spirit of wine, lay it on; when dry burnish it as before.

In laying on this gold, leave the lights without it, as it will appear to much greater advantage than if all the objects were covered; but provided the whole performance should be covered, the best way of setting it off is to trace over the shady parts with gall-stone, or the yellow made of French berries, heightened with minium.

Gamboge is one of the mellowest colours nature has produced; it is of so mild a temperature, that when it is touched with any fluid, it instantly dissolves; it is productive of a variety of most agreeable yellow tints, and will generally shade itself, though sometimes it requires help.

Gall-stone is a very rich deep yellow, tending towards a brown; it is exceedingly useful, in many cases, needs but little gumming or grinding, works free, but will not shade itself.

If we cut the roots of *barberries*, and put them to a strong luxivium of pearl-ashes and water, a very agreeable yellow will proceed from them.

Another fine transparent yellow is made by boiling the root of a *mulberry-tree*, well cleansed, in the foregoing lixivium.

Yellow ochre makes a very good pale yellow; and being ground with gum water proves extremely useful.

Another very agreeable yellow is made by infusing the plant *celadine* in water; gently press it, and add to the liquor some alum-water; then let it boil.

To extract yellow from French berries.

In a quart of the preceding lixivium, boil 2 oz. of French berries, till the liquor is of a fine yellow; strain it from the yellow berries, and when cold it is fit for use. To the berries put a pint of the same luxivium, and boil it till the liquor is as strong as gall-stones; with which shade any yellows: this boil till it comes to a brown, with the addition of a little ox-gall, it will serve to shade the gold-leaf.

A yellow may be made by infusing *saffron* in pure water. When this is steeped in rectified spirit of wine, there is nothing higher; but it is very apt to fly unless it is highly gummed.

A good yellow, for the illumination of prints, may be extracted from the *roots of ginger;* which make a good green, when mixed with transparent verdigris.

Those yellows called English and Dutch pinks, are made with *French berries*, ground to a fine powder, and then boiled.

King's yellow, a fine body-colour, is much used in heightening the ochre for gold lace, &c.

Orange colour is made of a mixture of vermilion and gamboge, the latter most predominant.

Reds.

Red-lead, or minium, is a strong heavy colour. The following are the directions for preparing it: Put four ounces in a glass, to a quart of rain water, and when it has been thoroughly stirred, pour off the water; by a frequent repetition of this, there will remain at the bottom of the glass a beautiful red, when dry, which is to be used with gum-water. When the colour has been thus prepared, not more than twenty grains will remain out of four ounces.

Carmine affords the highest and most perfect crimson, and is the most beautiful of all reds, for with this colour and lake the shades may be made as strong as wanted. This colour should never be purchased but at day-light; for if not good, it will spoil the work.

Lakes.

Lake is a fine transparent colour, not much inferior to carmine; but in painting with carmine on that part of the print on which the light is supposed to strike, lay on the first tint as light as possible, working it stronger as it grows darker, and touch it in the darker parts with lake.

To make lake, prepare a lixivium, made with the ashes of vine-twigs, and to three pints add a pound of the best ground Brazil-wood; boil it till half the lixivium is evaporated; strain it off; boil it again with the addition of four ounces of fresh Brazil-wood, two ounces of cochineal, half an ounce of terra merita, and a pint of water; evaporate as before; add half an ounce of burnt alum (reduced to an impalpable powder,) and a quarter of a drachm of arsenic; dissolve them in it, by stirring it with a stick; when settled strain it. To give this a body, reduce two cuttle-fish bones to a powder, and putting it in, let it dry leisurely. Grind it in a quantity of water, in which let it steep; strain it through a cloth, and making it into a few cakes, set it by for use, after drying it on a piece of marble.

If this is wanted redder, add some of the juice of a lemon; and to make it deeper, add oil of tartar.

Another lake.

Boil the shreds of superfine scarlet cloth in a ley made of the ashes of burnt tartar; when sufficiently boiled, add some cochineal, powdered mastic, and alum; boil this again, and strain it through a bag several times. The first time, the bag must be strained from top to bottom; and the remaining gross matter being taken out, let the bag be well washed; after this strain the liquor through the bag again, when a paste will remain on the sides, which divide into small cakes, for use.

Another.

Steep four ounces of the best Brazil-wood in a pint and a half of the finest distilled venegar, for three weeks at least, though the longer it remains the better it is; seethe the whole in *balneum mariæ*, till it boils up three or four times; let it settle for a day or two; put it to an ounce of powdered alum, and into a clean pan with the liquor; let it remain for twenty-four hours; heat the composition, and stir it till it is cold; when it has stood about twelve hours, strain it, and add two cuttle-fish bones, prepared as before.

Crimson.

In twelve ounces of pale stale beer, boil one ounce of ground Brazil-wood, till the colour is as strong as desired; strain it through a linen cloth, and bottle it up for use. If wanted to bring this colour to a body, take some dried ox-blood, reduced to a powder, and mix it with the colour.

A fine crimson may be extracted from the berry-bearing spinach, which, being pressed, affords a very agreeable juice; to this add a fourth part of alum; boil it, and when cold it is fit for use.

Or a very beautiful red may be extracted from the red beet root, baked with a little strong vinegar and alum: when cold it is fit for use.

Another.

Put twenty or more grains of bruised cochineal into a gallipot, with as many drops of the ley of tartar as will make it give forth its colour; add to this mixture about half a spoonful of water, or more, and a very agreeable purple will be obtained. Reduce some alum to a very fine powder, put it to the purple liquor, and a beautiful crimson will appear; strain it through a fine cloth: use it as soon as possible; for though this is a colour which, if soon used, looks extremely well, yet by long standing it is subject to decay.

Indian lake is far superior to any other of the kind, for the deep shades of red of all kinds, and works as free as gamboge. The best is brought from China in pots, and has the appearance of raspberry-jam, but very bitter to the taste: it requires no gum.

Purple.

Take eight ounces of logwood, a pint of rain water, and an ounce of alum; infuse it well over a slow fire, in a well glazed pan or pipkin, for about 24 hours; add 1-4 ounce of gum-arabic, let it stand for a week: strain it through a piece of fine cloth. Keep it close, or it will mould.

Another.

A redder purple may be made by adding to 1 oz. of the above, four ounces of Brazil wood, and a pint of stale beer; boiling it till the liquor is as strong as desired. It may be made darker by adding more logwood.

The richest purple is made by blending carmine and Prussian blue, or indigo, to whatever shade is wanted.

Blues.

Ultramarine is the best and brightest blue. Prepare it by heating six ounces of the lapis lazuli till it is red; cool it in strong vinegar; grind it with a stone and muller to an impalpable powder; then make a composition of bees'-wax resin, linseed-oil, and turpentine, of each three ounces: incorporate the whole together over a slow fire, till it is near boiling; pour them into a pan well glazed. This is called the paste of ultramarine. The lapis lazuli being prepared, add to it an equal quantity of the pastil, or paste; mix them together thoroughly, and let them remain twelve hours. To extract the ultramarine from the paste, pour clean water upon it; on pressing the paste with the hands, the ultramarine will come out for its reception: place a glass tumbler under the hand; let it settle in this water till the ultramarine sinks to the bottom.

If the colour seems foul, cleanse it thus: Dissolve some tartar in water; add as much of it to the ultramarine as will cover it; let it stand twelve hours: wash it in warm water, when the colour will be well clarified and perfectly clean. Let the ultramarine be of a high colour, and well ground.

Next to ultramarine in beauty, is *Prussian blue*, but it does not grind kindly with water, on account of its oily substance.

Blue bice is a colour of a very good body, and flows very agreeably in the pencil; wash it according to the rules laid down for ultramarine.

Blacks.

The proper blacks for water colours are as follow:

Ivory black, which is prepared in the following manner: Let the ivory black be thoroughly ground, and there will naturally proceed from it a liquor of an oily substance: mix as much of it as will make it work freely in the pencil.

It has a fine gloss, and is extremely serviceable in painting of shining objects.

Indian Ink is a very good black, and of great service, as it may be laid to any shade, and will always shade itself; on which account it is often used for drawings.

Greens.

Sap-green is a colour extremely serviceable, and the best green for water colours, being of a gummy substance, and diluting easily in water. It produces an endless variety of tints, and has the advantage of shading itself.

A sea, or artificial green, is made by mixing indigo and sap-green, which may be made lighter by adding more or less indigo; it is a very serviceable colour, easily worked, and productive of many tints. This colour, as well as sap-green, shades itself. The indigo must be well ground before you mix it.

Another is made with *indigo* and *gamboge,* well ground together: extremely useful in painting of trees, glass, vegetables, &c. With the addition of sap-green, it is very serviceable in flowers, and shading-in of garments.

Browns.

Burnt and unburnt terra de Sienna, are the warmest browns for front grounds, dead leaves, &c. work very free, and are of general use.

Bistre is also a good and serviceable colour. —The best sort is very bright and close; as it is a colour difficult to work of itself, mix a little Spanish liquorice with it, that will mellow and take off its harshness. It must be well ground; and the higher it is gummed, the better for use.

Spanish liquorice is productive of a great variety of brown tints, of a very agreeable colour; it will not shade itself, but works as free as any gum colours by diluting it in fair water.

A *brown mixture* is made by incorporating sap-green and carmine, which is of an extraordinarily soft nature; it is a colour extremely serviceable in painting flowers in water colours.

Another, by blending *vermillion* and *bistre* thoroughly: the bistre must be extremely well ground before it is incorporated with the vermilion, and it will produce a very good brown.

Directions for preparing mixed colours.

Ash colour.—Ceruse, Keating's black and white shaded with cherry-stone black.

Bay.—Lake and flake white, shaded with carmine: bistre and vermilion, shaded with black.

Changeable silk.—Red lead and masticot-water, shaded with sap-green and verdigris.

Another.—Lake and yellow, shaded with lake and Prussian blue.

Cloud colour.—Light masticot, or lake and white, shaded with blue verditer.

Another.—Constant white and Indian ink, a little vermilion.

Another.—White with a little lake and blue verditer, makes a very agreeable cloud colour, for that part next the horizon.

Crimson.—Lake and white, with a little vermilion, shaded with lake and carmine.

Flame colour.—Vermilion and orpiment, heightened with white.

Another.—Gamboge, shaded with minium and red lead.

Flesh colour.—Ceruse, red lead, and lake, for a swarthy complexion, and yellow-ochre.

Another.—Constant white and a little carmine, shaded with Spanish liquorice, washed with carmine.

French green.—Light pink and Dutch bice, shaded with green pink.

Glass grey.—Ceruse, with a little bluo of any kind.

Hair colour.—Masticot, ochre, umber, ceruse, and cherry-stone black.

Lead colour.—Indigo and white.

Light blue.—Blue bice, heightened with flake white.

Another.—Blue verditer, and white of any sort, well ground.

Light green.—Pink, smalt, and white.

Another.—Blue verditer and gamboge.

Another.—Gamboge and verdigris. The chief use of this green is to lay the ground colours for trees, fields, &c.

Lion tawney.—Red led, and masticot, shaded with umber.

Murrey.—Lake and white lead.

Orange.—Red lead and a little masticot, shaded with gall-stone and lake.

Orange tawney.—Lake, light pink, a little masticot shaded with gall-stone and lake.

Pearl colour.—Carmine, a little white shaded with lake.

Poppingay green.—Green and masticot; or pink and a little indigo, shaded with indigo.

Purple.—Indigo, Spanish brown, and white; or blue bice, red and white lead; or blue bice and lake.

Russet.—Cherry-stone black and white.

Scarlet.—Red lead and lake, with or without vermilion.

Sea-green.—Bice, pink, and white, shaded with pink.

Sky colour.—Light masticot and white, for the lowest and lightest parts: second, red ink and white; third, blue bice and white: fourth, blue bice alone. These are all to be softened into one another at the edges, so as not to appear harsh.

Sky colour for drapery.—Blue bice and ceruse, or ultramarine and white, shaded with indigo.

Straw colour.—Masticot and a very little lake, shaded with Dutch pink.

Yellow colour.—Indigo, white, and lake; or fine Dutch bice and lake, shaded with indigo; or litmus, smalt, and bice, the latter most predominant.

Water.—Blue and white, shaded with blue, and heightened with white.

Another.—Blue verdigris, shaded with indigo, and heightened with white.

Directions for using the colours.

The pencils must be fast in the quills, not apt to part in the middle.

Before beginning, have all the colours ready, and a palette for the conveniency of mixing them; a paper to lay under the hand, as well as to try the colours upon; also a large brush, called a fitch, to wipe off the dust from them.

Being now prepared, proceed in the painting; which, if a landscape, lay on first dead colours freely all over the piece leaving no part uncovered.

Then proceed with the lighter parts, as the sky, sun-beams, &c.: then the yellowish beams, with masticot and white; next the blueness of the sky, with blue verditer alone; for purple clouds, mix only lake and white, making the colours deeper as they go upwards from the horizon, except in tempestuous skies. The tops of distant mountains must be worked so faint, that they may seem to lose themselves in the air.

Bring the colours forward as the distance decreases; painting the first ground next the horizon, downwards, of a bluish sea green; and as you advance forward, of a darker green, till you come to the fore-ground itself; which, as it is the darkest part of all, with dark green, worked so as to give the appearance of shrubbery, &c.

In painting trees, having first laid a little verdigris green for a dead colour, proceed with working it so as to give a leafy appearance.

Bring some of the leaves forward with masticot and white; for the trunk, work the brown with sap-green; if oak trees are introduced, lay on some touches to express leaves of ivy twined about it.

All distinct objects are to be made imperfect, as they appear to the eye.

In painting flesh, the following are the best directions for preparing the work so as afterwards more readily to produce the effects of colours seen in nature.

Take flake-white and a little lake, blend together, and with that lay the ground colour; then shade with red ochre, cherry-stone black, and a little lake, mixed together, touching the lips, cheeks, &c. with a tint of carmine, and heighten the flesh with white and a little carmine. Remember never to heighten it with pure white, which will always give it a cold appearance.

It may be recommended to the student in general, whatever is the subject of his drawing, not to finish any one part first, but to work up every part gradually alike, until he finds nothing wanting to complete the whole.

Wherever he lays on strong touches, he must be careful in those places to bring up his work to an equal roundness and strength, tempering and sweetening the colours with a sharper pencil than the first, that no lumps or harsh edges may be left, but that the shadows may all lie dispersed, soft and smooth, and gliding gently into one another.

The occasional roughness of the work need not discourage the artist; for it is easily softened by degrees, with other tints and shadows: observing only to sweeten, mellow, and heighten them according as the light happens to fall.

A method has been lately discovered of combining the effects of water colours with those of crayon-painting by means of wax crayons. It is an ingenious and pleasing mode of practice.

To prevent the colours from cracking.

Boil 2 ounces of the best and clearest glue, with 1 pint of clear water, and a half an ounce of the finest alum, till dissolved. This is a very serviceable liquor, with which temper those colours, intended for sky, as it will prevent them from cracking.

To make a solution of gum.

Dissolve an ounce of white gum arabic, and half an ounce of double refined sugar, in a quart of spring-water; strain it through a piece of muslin, then bottle it off for use, keeping it free from dust.

Another method.

Take some of the whitest sort of gum-arabic, then bruise and tie it in a piece of woollen cloth, steep it in spring water till dissolved. If too stiff, which is known by the shining of the colours, add more water; if too weak, more gum. With this water temper most of the colours, using such a quantity of it, that the colours, when dry, being touched, will come off.

To keep flies from the work.

Having prepared the gum water, add a little coloquintida, which, if the work should be exposed, will keep it from being damaged by the flies.

To prepare alum water.

Take 4 ounces of alum, and a pint of spring water; boil it till the alum is thoroughly dissolved; filter it through blotting paper, and it is fit for use.

Before laying on the colours, take some of this water hot, and with a sponge wet the back of the paper, which, if not good, must be wetted three or four times. This will not only prevent the sinking of the colours, but will also keep them from fading, and give an additional beauty and lustre. Remember that the paper must be dried each time before wetting it again.

To make lime water.

Put some unslaked lime in a well-glazed pan; cover it with pure water; let it remain so for one day, then strain off the water, and keep it for use. By the means of this water, sap green may be changed into blue.

To make a lixivium of pearl ashes.

Steep half an ounce of pearl ashes in clear water for one day; strain off the water as clean as possible. This infusion will prove extremely serviceable in many colours, particularly Brazil wood, to which it will give an additional beauty and lustre.

To restore decayed colours.

Take distilled rosemary water, or essence of rosemary, and with a few drops temper the colours, which, however dead or faded, will recover their primitive brilliancy. This essence will prevent the bubbles which are troublesome in grinding white and umber.

Liquid gold for vellum painting.

Having procured some of the finest leaf

gold, grind it with strong gum-water adding more gum-water as is found requisite; when thoroughly ground temper it with a small quantity of sublimate of mercury, binding it in the shell with a little dissolved gum; spread it equally over the shell, and use it with water only, for gilding fans, &c.

Liquid silver for the same.

The manner of making this is the same as that of making liquid gold, only remembering to temper it with glaire of eggs, and not water.

To make glaire of eggs.

Beat the whites with a spoon till they rise in a foam: let them stand twelve hours, and they will be clarified into good glaire.

To restore rusted liquid silver.

If silver becomes rusty, cover that part of the performance with the juice of garlic, which will recover it effectually.

Ground to lay silver or gold upon.

Take the new shreds of parchment, (as they are far preferable to glove leather) and boil them in a quart of spring water till consumed to a pint; strain the size from the shreds, and put it into a well glazed pan; use it before it is cold. Be careful, when laying on the silver or gold, that the size is not too moist, nor too dry, for in either case there will be danger of impairing the work.

To prevent gloss on drawings.

Too much gum in the composition of ink employed in drawings is the cause of the offensive gloss which arises, in different degrees, from what is called Indian ink, according to the caprice or ignorance of the manufacturer. This evil is irremediable, made with such ink, without the risk of defacing their surfaces. But it may be avoided by the artist composing his own ink, by an union of ivory or lamp black, with a small portion of Prussian blue, or indigo, for a blue black; and the same blacks united with raw or burnt umber, bister, vandyke, or any other brown instead of the blue for a brown black. These should be incorporated by mixing them in weak gum water, (or perhaps malt-wort would answer better,) first levigating them very fine in common water, on a marble slab. When dried to a paste, the glutinous matter should be and not till then, well mixed with them. The proper strength may be readily known by a few trials, and that will be found sufficiently strong which binds the composition enough to prevent rubbing off by the touch. Indian ink drawings should be handled as little as possible, for the slightest rubbing produces a certain degree of gloss, and frequent repititions of it makes the gloss more apparent and decided.

To prepare wash colours for maps.

For yellow.

Dissolve gamboge in water, or French berries steeped in water, the liquor strained, and gum arabic added.

For red.

Steep Brazil dust in vinegar, with alum.

Or, dissolve litmus in water, and add spirit of wine.

Or, steep cochineal in water, strained, and add gum.

For blue.

Dilute Saxon blue with water.

Or, to the solution of litmus add distilled vinegar.

For green.

Dissolve distilled water in verdigris, and add gum.

Or, dissolve sap green in water, and add gum. Litmus is rendered green by adding p. p. m. kali to its solution.

To keep water colours from sinking.

Boil 4 ounces of alum in a pint of spring water, till it is thoroughly dissolved; filter it through brown paper, and keep it for use.

Before laying on the colours, take a sponge, and wet the back of the paper with this water while it is hot. This will not only prevent the colours from sinking, but will likewise give them an additional beauty and lustre, and preserve them from fading. If the paper is not good it must be washed three or four times with this water, drying it every time.

If the prints are to be varnished, was them all over with white starch, before beginning to lay on the colours.

To prepare charcoal and chalks for drawing.

Saw the finest grain charcoal into slips of the size wanted, and put them into a pipkin of melted bees'-wax; put them near a slow fire for half an hour, take them out, and when they are perfectly cool they are fit for use. The advantages of these pencils are, that they can be made at the most trifling expense, and that drawings made with them are as permanent as ink.

The above process will harden both red and black chalks, and make them permanent also.

To make carminated lake for crayons.

The decoction which floats over the coloured precipitate known by the name of carmine, being still highly coloured, the addition of sulphat of alumine, which is afterwards decomposed by a solution of carbonate of soda, disengages the alumine, and the latter, in precipitating itself, carries with it the colouring part of the bath. According to the dose prescribed for the composition, two or three ounces of alum may be employed. The greater or less quantity of this substance, the base of which seizes on the colouring fecula, determines the greater or less intensity observed in the colour of the lake resulting from it. When the process is conducted on a small scale, and by way of trial, the precipitate is received on a filter. It is then washed with warm water, and when it has acquired the consistence of soft paste, it is formed into small cakes or sticks. It is this substance which constitutes the beautiful carminated lakes used for crayon painting.

Another in the large way.

In operating on a large scale, the whole of the alkaline liquor judged necessary, after a few trials, to decompose the quantity of alum intended to be employed, may be divided into three or four separate portions. As many cloth filters as there are alkaline portions, being then prepared, the first portion of alkaline liquor is poured out, and the coloured precipitate resulting from it is received on one of the filters: the coloured liquor which passes through the filter receives the second portion of alkaline liquor, and the latter produces a second precipitate, which is received on a new filter. This operation is then continued till the last portion of alkaline liquor has been employed. The lakes deposited on the filters are washed in warm water; and when drained, are carried along with their cloth to the plaister driers, or to beds of new bricks. These driers, made of wrought plaister in the form of thick basins, attract the moisture of the paste, and shorten the process. The first precipitation gives a carminated lake of a very high colour; the second is somewhat higher; and the rest go on decreasing in the same manner.

By these means the artist obtains from the same bath shades of colour varied to infinity, much mellower, and more delicate than those resulting from a mechanical mixture of white clay in different doses, and lake saturated with colour by one operation.

To preserve pencil and chalk drawings.

Get a *pan* or *tub*, sufficiently spacious to admit the drawing horizontally; fill it with clean water, and run the drawing through in that direction: then lay it on something flat to dry. (Do not lay the drawing, while *wet*, on any coloured wood, such as mahogany, &c. which will stain the paper in streaks.) This will take off the loose lead.

Secondly. Fill the same vessel a second time, with rather more than one-third new milk, and the remaining part clean water, through which run the drawing again horizontally, and leave it to dry as before.

Should milk be scarce, mix a little (in the proportions above-mentioned), in a tea-cup, and run the drawing *lightly* over with a camel-hair pencil, the water having already taken off the superfluous lead, and, in some degree, fixed the other; but be *particularly light* with the pencil, never touching the drawing twice in the same place.

To preserve black lead pencil drawings.

Apply a thin wash of isinglass, which will prevent rubbing off of either black-lead, or of hard black chalk. The simple application of skimmed milk will produce the same effect. In using the latter, lay the drawing flat, upon the surface of the milk; then taking it up, expeditiously, hang it, by one corner, till it drains and dries. The milk must be perfectly free from cream, or it will grease the paper.

To make artificial black lead pencils.

Melt together fine Cumberland black-lead in powder and shell lac. This compound is to be repeatedly powdered and re-melted until of uniform composition; it is then sawn into slips, and mounted as usual. Pencils thus made are uniform, and of great strength, and there is no waste of materials.

To make English drawing pencils.

They are formed of black-lead alone, sawed into slips, which are fitted into a groove made in a piece of wood, and another slip of wood glued over them: the softest wood, as cedar, is made choice of, that the pencil may be the easier cut; and a part at one end, too short to be conveniently used after the rest has been worn and cut away, is left unfilled with the black-lead, that there may be no waste of so valuable a commodity.

These pencils are greatly preferable to others, being accompanied with some degree of the same inconvenieces, and being very unequal in their quality, on account of different sorts of the mineral being fraudulently joined together in one pencil, the fore-part being commonly pretty good, and the rest of an inferior kind. Some, to avoid these imperfections, take the finer pieces of black-lead itself, which they saw into slips, and fix for use in port-crayons: this is doubtless the surest way of obtaining black-lead crayons whose goodness can be depended on.

To make crayons for drawing.

Mix to one pint of boiling water 3 ounces of spermaceti, 1 lb. of fine ground long ash with the colouring matter a sufficient quantity; roll out the paste and when half dry cut it in pipes.

Another method.

This preparation has given birth to a particular kind of painting. In the large way, it consists in mixing up with the coloured bath an argillaceous matter of the first quality, and subjecting the whole to careful evaporation, or in exposing the liquid paste on driers of plaister with a clean cloth to prevent the crayon from adhering to the drier.

This method is more economical than the chemical process; but it requires a very nice choice in the quality of the white desired for the operation, and in particular the precaution of previous washing, to remove the fine sandy parts with which the finest white clays are mixed.

If the composer of crayons be also a manufacturer of carminated lakes, and prefer to mix the bath of cochineal with white clay, well washed and of the first quality, he may obtain the same shakes by diluting with one measure of the decoction of cochineal different quantities of clay.

For example, a pound of decoction saturated with colour, and a quarter of a pound of clay; the same quantity of decoction, and half a pound of clay; a pound, and so on.

To enlarge or diminish the size of a picture.

Divide the sides of the original with a pair of compasses into any number of equal parts, and rule lines across with a black-lead pencil from side to side, and from top to bottom. Then having the paper of the size intended, divide it into the same number of squares, either larger or less, to enlarge or contract it. Then placing the original before you, draw square by square the several parts, observing to make the part of the figure you draw fall in the same part of the squares in the copy as it does in the original. To prevent mistakes number the squares both of the original and copy.

To prevent the necessity of ruling across the original, which may injure it, take a square pane of crown glass and divide its sides, and also its top and bottom into equal parts; then from each division draw lines across the glass with lamp black ground with gum water, and divide the glass into squares. Then lay the glass upon the original and having drawn the same number of squares upon the paper, proceed to copy into each square on the paper what appears behind each corresponding square of the glass. Instead of a glass, an open frame with threads stretched across will answer.

To take a copy of a print or drawing.

Take a sheet of the finest white paper, wet it over with clean linseed oil on one side, and wipe the oil off clean, then let it stand and dry, otherwise it will spoil a printed picture by the soaking through of the oil. Having thus prepared the paper, lay it on any printed or painted picture; and it may be seen perfectly through, then with a black lead pencil copy with ease any picture on the oiled paper, then put it upon a sheet of clean white paper, and with a little pointed tracer or burnisher, go over the strokes drawn upon the oiled paper, and the same will be very neatly and exactly drawn upon the white paper.

To make a scale for dividing the varnishing lines in perspective.

Take a sheet of paper, and having made an horizontal line, fix on a point, as a centre, called the point of sight. Let this point be crossed with diagonal lines, in various directions.

The instrument thus prepared, will form a sure guide to an unexperienced eye, in taking the prospective lines of all objects placed at right angles, such as streets, buildings, churches, apartments, by merely placing it under the leaf to be drawn on. To render the instrument more complete, a plate of glass should be added of the same size as the leaf of the drawing book on which the dark lines should be drawn.

To mix water colours for animals.

Horses.

Chesnut brown.—Red ochre and black, mixed together, shaded with black, heightened with red ochre and white.

Grey.—Black and white mixed, shaded with black, white, and bistre; heightened with pure water.

Black.—Black lightly laid on, shaded with Keating's black and bistre; heightened with masticot.

Lions.

Colour much the same manner as hogs, adding lake in the ground colour.

Bears.

Brown-ochre, red-ochre, and black, mixed; shaded with bistre and ivory-black.

Wolves.

Spanish liquorice and black, shaded with black.

Asses.

Black and white mixed; or add a little brown ochre shaded with black.

Elephants.

Black, white, and Spanish liquorice mixed: shaded with black and bistre; the inner part of the nose vermillion and white, shaded with black.

Monkeys, &c.

Dutch pink and black, heightened with masticot and white: the face, black and bistre mixed, as also their feet, and below their bellies, shaded with black and pink mixed with a little brown ochre.

Stags.

Brown-ochre, shaded with bistre towards the back; the neck and belly white, the mouth and ears inclining to red, the hoofs black, and legs shaded with black.

To paint fruit in water colours.

Apples.—Thin masticot mixed with verdigris, shaded with brown ochre.

Pears.—Masticot, deepened and mellowed with brown ochre; the bloom the same as the apple.

Cherries.—Vermilion and lake, shaded with carmine, heightened with vermilion and white.

Strawberries.—White; draw it over with vermilion and lake, shaded with fine lake, heightened with red lead and masticot mixed; and, after, with white; stipple them with white and thin lead only.

Blue Grapes.—Dark purple, shaded with blue; the bloom bice.

White Grapes.—A mixture of verdigris and masticot, shaded with thin verdigris, heightened with masticot and white.

Peaches.—This masticot, shaded with brown ochre; the bloom lake, heightened with white.

To paint flowers.

Auriculas.—A tender wash of gambogo, shaded with sap green and carmine, blended together. Round the centre leave a broad white space, which shade with Indian ink and green sap, mixed; stipple the gamboge with a purple extracted from logwood, the cup, in the inside, strong yellow, shaded with Dutch pink, or gall-stones; stipple it with white, darkening the white gradually with Indian ink, as the shade increases.

Anemones.—A thin wash of gamboge, shaded with bistre, or carmine and sap green blended together; the stripes carmine, shaded with the same, indigo in the darkest parts, or stipple with it. The leaves sap green, shaded with indigo and French berries; the stalk brown.

Yellow Crown Imperials.—A thin wash of gamboge, upon that another of washed red lead, shaded with carmine. The leaves sap green, shaded with indigo and French berries.

Roses.—A light tint of pure carmine, over which, another equally light of Peruvian blue, which will give the flowers a tint of that bloom which appears in nature; proceed with darker shades of carmine, of the best sort. In the darkest parts of the flower, add a little indigo, which will give a roundness and body to your work.—If the seeds are seen, lay on some gamboge, shaded with gall-stone; the upper side of the leaves sap green, shaded with indigo and French berries mixed; the under part, white indigo and sap green mixed; shaded with the same. The stalks brown, made of sap green and carmine, shaded with indigo.

Rose-buds.—A pale wash of carmine shaded with a stronger wash of the same; let the hatchings be extremely tender, preserving that transparency and sweetness the flower has by nature. The stalks and leaves begin and finish with sap green, after which, a slight wash of carmine.

Orange Crown Imperials.—A thin wash of red lead, the light shades carmine, the dark vermilion and bistre mixed; the seed the same as the flower. The leaves and stalks as the preceding.

Honey Suckles.—The inside of the petals white, shaded with sap green, or gamboge and bistre; which insides are to be shewn by curling the leaves back at the ends, or splitting them. The outsides, a thin wash of ermine and lake mixed, shaded with carmine,—indigo for the darkest shades. It is to be observed, that some of the flowers growing on the same stalk are inclinable to purple, others to carmine: the style and buttons to be seen at the end of the flower, are of a faint green. The stalks, sap green and carmine; the leaves sap green, shaded with indigo and French berries.

To draw birds in water colours.

Eagles.—Black and brown, shaded with indigo; the feathers heightened by brown ochre and white; the beak and claws saffron, shaded with bistre; the eyes with vermilion, heightened with masticot or saffron, shaded with vermilion.

Turkeys.—Both male and female:—the back black and white, mixed gradually, shaded off to a white under the belly; sprinkled and shaded with black.

Swans.—White shaded with black; the legs and bills black; the eyes yellow, a ball in the midst.

Geese.—Ceruse shaded with black; the legs black; the bill red.

Pheasants.—White and black mixed; the eyes like those of the falcon; the legs Dutch pink, shaded with black.

Owls.—Ochre mixed with white, in different shades; the legs yellow ochre.

Rules for painting landscapes in water colours.

The most useful colours for landscapes are, lake, burnt ochre, gamboge, indigo, or light red, sepia, Prussian blue, and terra de sienna.

Skies are tinted with indigo; and the distant hills may also receive a finish wash of the same colour. Buildings, ground, and road, should be tinted with ochre. The bushes and grass may be forwarded with a tint of gamboge. The distances may be heightened with a tint of lake, and the dark shadows of the building may be tinted with sepia.

In retiring hills, tint the whole with weak blue, then the nearer ones with indigo and lake; then add a little gamboge to the next, keeping one subordinate to the other; the most distant being lost in the aerial tints. Clouds should be tinted with sepia. Opposing masses of trees should be tinted with sepia and indigo, and distant trees with grey. The lights warmed with gamboge and ochre, and their shades deepened with indigo. Force is acquired by adding sepia to indigo, in the cold parts, and sepia with lake to the glowing parts. Breadths of light are obtained by destroying the scattered lights with greys.

To prepare a landscape.

The student is first to sketch the outlines faintly with a black lead-pencil, and then proceed with the hair pencil to tint and shadow, without the intervention of the crow-pen, or without any other fixed outline than what the tints and shadows produce.

The mixture of the grey colour is made of burnt umber, indigo, and lake; each to be rubbed in a saucer separately, and then mixed in due proportion in a fourth saucer, so as to produce the exact colour, which may be called a warm grey.

The colour is then to be thinned with water for the light tints, as the sky, distances, &c. Deeper are to be used for the darker shadows, and near parts, finishing off and softening with water, till the exact effect is produced.

He may then proceed to colour according to the following directions.

Colours to be used.—Coal brown, rosy madder, Prussian blue, indigo, ultramarine, brown sienna, Roman ochre, yellow ochre, Venetian red, gamboge, burnt sienna, lamp black, Vandyke brown, purple lake.

To select the colours.

The clouds are produced by a thin mixture of indigo and lake.

The azure sky, towards the horizon, is of lake and gamboge, and should be done with a clear brush.

The lower, or horizontal clouds, are tinged with ultramarine.

The distant lands are of ultramarine and lake.

The distant trees are also of ultramarine, with a wash of indigo, gamboge, and burnt sienna.

The middle distance trees are produced by a thin wash of burnt sienna and gamboge.

The near trees are tinted with a wash of burnt sienna, indigo, and gamboge; towards the shadows more of indigo is incorporated.

The grass is washed with a mixture of burnt sienna, indigo, and gamboge; that in shadow has rather more indigo.

The road and paths are produced by a mixture of lake, burnt umber, and burnt sienna.

The house is sometimes tinted with a mixture of lake and gamboge. The tiling and shadows have an excess of lake.

The windows are of indigo and burnt umber.

The smoke is lake and indigo.

The sheep are of burnt umber and gamboge.

The figures are touched with lake and indigo.

For landscapes, no other colours than the above are requisite, and they can be purchased in prepared cakes.

TO PAINT IN CRAYONS.

Implements.

The student must provide himself with some strong blue paper, the thicker the better, if the grain is not too coarse or knotty, the knots should be levelled with a penknife or razor, otherwise they will prove exceedingly troublesome. After this is done, the paper must be passed very smooth on a linen cloth, previously strained on a deal frame, the size according to the artist's pleasure: on this the picture is to be executed; but it is most eligible not to paste the paper on till the whole subject is first dead coloured. Now lay the paper with the dead colour on its face upon a smooth board, when by means of a brush, the backside of the paper must be covered with paste: the frame, with the strained cloth, must then be laid on the pasted side of the paper; after which turn the painted side uppermost, and lay a piece of clean paper upon it, to prevent smearing it; this being done, it may be stroked over gently by the hand; by which means all the air between the cloth and the paper will be forced out.

When the paste is perfectly dry, the painting may be proceeded with.

Drawing the outlines.

Let the outlines be drawn on the glass with a small camels'-hair pencil dipped in lake, ground them with oils, which may be done with great exactness. After this is accomplished, take a sheet of paper of the same size, and place it on the glass, stroking over all the lines with the hand, by which means the colour will adhere to the paste, which must be pierced with pin holes pretty close. The paper must be next laid upon the table, and the pierced paper laid upon it; then with some fine pounded charcoal, tied up in a piece of lawn; rub over the pierced lines, which will give an exact outline; but great care must be taken not to brush this off till the whole is drawn over with sketching chalk, which is a composition made of whiting and tobacco-pipe clay, rolled like the crayons and pointed at each end.

Painting from life.

When a student paints immediately from life, it will be prudent to make a correct drawing of the outlines on another paper, the size of the picture he is going to paint, when he may trace by the preceding method, because erroneous strokes of the sketching chalk will prevent the crayons from adhering to the paper, owing to a certain greasy quality in the composition.

Posture and light.

The student will find the sitting posture with the box of crayons in his lap the most convenient method for him to paint. The part of the picture he is immediately painting, should be rather below his face; for, if it is placed too high the arm will be fatigued. Let the window of the room where he paints be darkened at least to the height of six feet from the ground; and the subject to be painted should be situated in such a manner, that the light may fall with every advantage on the face, avoiding much shadow, which seldom has a good effect in portrait painting.

Features of the face.

The features of the face being correctly drawn with chalks, let the student take a crayon of pure carmine, and carefully draw the nostril and edge of the nose next the shadow; then, with the faintest carmine tint, lay in the highest light upon the nose and forehead, which must be executed broad. Then proceed gradually with the second tint, and the succeeding ones, till arrived at the shadows, which must be covered brilliant, enriched with much lake, carmine, and deep green. This method appears at first uninviting, but in the finishing it will produce a pleasing effect, colours being much easier sullied when too bright, than when its colouring is dull, to raise the picture into a brilliant state. The several pearly tints distinguishable in fine complexions, must be imitated with blue verditer and white, which answers to the ultramarine tints used in oil. But if the parts of the face where these tints appear are in shadow, the crayons composed of black and white must be substituted in their place. When the student begins the eyes, let him draw them with a crayon inclined to the carminated tint, of whatever colour the irises are; he must lay them on brilliant, and thin of colour, not yet noticing the pupil: he must then let the light of the eye incline very much to the blue cast, cautiously avoiding a staring white appearance, preferring a broad shadow thrown on the upper part of the eyelash. A black and heavy tint is also to be avoided in the eye brows; it is therefore best to execute them like a broad glowing shadow at first, on which in the finishing, the hairs of the brow are to be painted; by which method of proceeding the former tints will show themselves through, and produce the most pleasing effect.

The student should begin the lips with pure carmine and lake, and in the shadow use some carmine and black; the strong vermilion tints should be laid on afterwards. He must be aware of executing them with stiff hard lines, gently intermixing each with the neighbouring colours, making the shadow beneath broad and enriched with brilliant crayons. He must form the corner of the mouth with carmine, brown ochre, and greens, variously intermixed. If the hair is dark, he should preserve much of the lake and deep carmine tints therein; this may be overpowered easily by the warmer hair-tints, which as observed in painting the eye-brows, will produce a richer effect when the picture is finished; on the contrary, if this method is neglected, a poverty of colouring will be discernible.

After the artist has dead coloured the head, he is to begin rubbing the forehead at the strongest light, first over with his finger, passing it very lightly till he unites it with the next tint, and so on till the whole is softened together, often wiping his finger to prevent the colours being rubbed. After the head is forwarded let him lay in the back ground, covering it as thin as possible, and rubbing it into the paper with a leather stump. Near the face the paper should be almost free from colour. In the back ground also those crayons which are the most brilliant should be used, next paint the edges of the hair over in a light and free manner.

The artist may now note what parts are too light and what too dark. He is then to complete the back-ground, and the hair, as the dust in painting these will fall on the face, and would much injure it if completed first.

In the last painting of the forehead, begin the highest light with the most faint vermilion tint; in the next shade, succeeding the lightest, the student must work in some light blue tints, composed of verditer and white, intermixing with them some of the deeper vermilion tints, so as to let them insensibly melt into each other: some brilliant yellows may be sparingly used; and towards the roots of the hair, strong verditer tints, intermixed with green, will apply well. Beneath the eyes the sweet pearly tints are to be kept composed of verditer and white, and under the nose, and on the temples, the same may be used: beneath the lips the same is also proper, mixing them with light green and some vermilion.

In finishing the cheeks, clear them with pure lake, then intermix with the same, bright vermilion; and last of all, if required, a few touches of the orange coloured crayon. After, sweeten that part with the finger as little as possible for fear of producing a heaviness on the cheeks.

The eye is the most difficult feature to execute. If the eye lashes are dark he must use some of the carmine and brown ochre, and the crayon of carmine and black; and with these last, of brown or hazel, make a broad shadow caused by the eye-lash. The pupil of the eye must be made of pure lamp black; between this and the lower part of the iris the light will catch very strong, but it must be gently diffused round the pupil till it is lost in shade. When the eye-balls are sufficiently prepared, the shining speck must be made with a pure white crayon; first broken to a point, and then laid on firm; but as it is possible they may be defective in neatness, they should be corrected with a pin, taking off the redundant parts.

The difficulty with respect to the nose is to preserve the lines properly determined, and at the same time so artfully blended into the cheek, as to express its projection, and yet no real line to be perceptible upon a close examination; in some circumstances it should be quite blended with the cheek, which appears behind it, and determined entirely with a slight touch of red chalk. The shadow caused by the nose is generally the darkest in the whole face. Carmine and brown ochre, and carmine and black, will compose it best.

Having prepared the lips with the strongest lake and carmine, they must, with these colours, be made perfectly correct; and when finished, introduce the strong vermilions, but with great caution, as they are extremely predominant. This, if properly touched, will give the lips an appearance, equal, if not superior, to those executed in oils, notwithstanding the seeming superiority the latter has by means of glazing.

The neck, &c.

To paint the neck, the artist should avoid expressing the muscles too strong in the stem, nor should the bones appear too evident on the chest, as both have an unpleasing effect, denoting a violent agitation of the body—a circumstance seldom necessary to express in portrait painting. The most necessary part to be expressed, and which should ever be observed, even in the most delicate subject, is a strong marking just above the place where the collar bones unite; and if the head is much thrown over the shoulders, some notice should be taken of a large muscle that rises from behind the ear, and is inserted into the pit between the collar bones. All inferior muscles should be in general quite avoided. The student will find this caution necessary, as most subjects, especially thin persons, have the muscle of the neck much more apparent than would be judicious to imitate. In colouring the neck, let the stem of a pearly hue predominate, and the light not so strong as on the chest. If any part of the breast appears, its transparency must also be expressed by pearly tints; but the upper part of the chest should be coloured with beautiful vermilions, delicately blended with the other.

Draperies, &c.

Dark blue, purple, black, pink, and all kinds of red draperies also, should be first tinged with carmine, which will render the colours much more brilliant than any other method; over this should be laid on the paper the middle tint, (a medium between the light and dark tints, of the drapery is to be painted,) except the dark masses of shadow; which should be laid on at first as deep as possible; these sweetened with the finger, being destitute of smaller folds, will exhibit a masterly breadth, which the lesser folds, when added, ought by no means to destroy. With the light and dark tints, the smaller parts are next to be made with freedom, executing as much with the crayon, and as little with the finger as possible: in each fold touching the last stroke with the crayon which the finger must never touch. In the case of reflections, the simple touch of the crayon will be too harsh, therefore fingering will be necessary afterwards, as reflected lights are always more gentle than those which are direct. With respect to reflections in general, they must always partake of the same colour as the object reflecting; but in cases of single figures, it may be useful to make some particular observations.

In a blue drapery, let the reflections be of a greenish cast: in green draperies, make them of a yellow tint, in yellow of an orange, in orange reflect a reddish cast; in all reds something of their own nature, but inclined to the yellow; black should have a reddish reflection; the reflection of a reddish tint will also present purples to the best advantage. Of whatever colour the drapery is, the reflection of the face must partake thereof, otherwise the picture, like painting on glass, will have but a gaudy effect.

Linen, lace, fur, &c. should be touched spiritedly with the crayon, fingering very little, except the latter; and the last touches even of this, like all other parts, should be executed with the crayon, without sweetening with the finger.

To prepare coloured crayons.

Take a large vessel of water, put the whiting into it, and mix them well together; let this stand about half a minute, then pour the top into another vessel, and throw the gritty sediment away; let what is prepared rest about a minute, then pour it off as before, which will purify the whiting, and render it free from all dirit and grittiness. When this is done, let the whiting settle, and then pour the water from it; after which lay it on the chalk to dry, and keep it for use, either for white crayons, or the purpose of preparing tints with other colours, for with this all other tints may be safely prepared. If the student wishes to make crayons of the whiting directly after it is washed, it is not necessary to dry it on the chalk, for it may be mixed instantly with any other colour, which will save considerable trouble. All colours of a heavy or gritty nature, especially blue verditer, must be purified by washing after this method.

The student must be provided with a large flexible pallet-knife, a large stone and muller to levigate the colours, two or three large pieces of chalk, to absorb the moisture from the colours after they have been levigated, a piece of flat glass, to prevent the moisture from being absorbed too much, till the colours are rolled into form, and vessels for water, spirits, &c. as necessity and convenience shall direct.

Reds.

It is rather difficult to procure either good carmine or good lake. Good carmine is inclined to the vermilion tint, and good lake to the carmine tint. The carmine crayons are prepared in the following manner.

Carmine.

As their texture is inclinable to hardness, instead of grinding and rolling them, take a sufficient quantity of carmine, laying it upon the grinding-stone, mix it with a levigating knife with spirit of wine, till it becomes smooth and even. The chalk-stone being ready, lay the colour upon it to absorb the spirit; but be careful that it is laid in a proper state for painting. If it is levigated too thin, the crayons will be too flat, and if too thick, it will occasion a waste of colour, by their adhering to the pallet-knife; but practice will render the proper degree of consistence familiar. The simple colour being prepared, the next step is to compose the different tints by the mixture with whiting; the proportion to be observed consisting of twenty gradations to one, which may be clearly understood by the following gradations. Take some of the simple colour and levigate it with spirit of wine, adding about one part of washed whiting to three parts of carmine, of which when properly incorporated, make two parcels. The next gradation should be composed of equal parts of carmine and whiting, of which four crayons may be made. The third composition should have one-fourth carmine, and three-fourths whiting; of this make six crayons, which will be a good proportion for the rest. The last tint should be made of whiting, very faintly tinged with carmine, of which make about twenty crayons, which will complete the above-mentioned proportion. As these compound tints are levigated, they are to be laid immediately upon the cloth, that the moisture may be absorbed to the proper degree of dryness to form it into crayons, which may be known by its losing the greater part of its adhesive quality when taken into the hand; if the consistency is found to be right, it may be then laid upon the glass, which, having no pores, will prevent the moisture from being carried off before it is convenient to form it into crayons, otherwise the crayons will be full of cracks and very brittle, which will be a great inconvenience when they are used in painting.

Lake.

This is a colour very apt to be hard, to prevent which the student must observe the following particulars. Take about half the quantity of lake intended for the crayons; and grind it very fine with spirit of wine; let it dry, and then pulverize it, which, if the lake is good, is easily done; then take the other half and grind it with spirit; after which mix it with the pulverized lake, and lay it out directly in crayons on the chalk. This colour will not bear rolling. The simple colour being thus prepared, proceed with the compound crayons as directed before, and in the same gradation as the carmine tint.

Vermilion.

The best is inclined to the carmine tint. Nothing is required to prepare this colour more than to mix it on the stone with soft water or spirit, after which it may be rolled with crayons. The different tints are produced by a mixture of the simple colour with whiting, according to the proportions already given.

Blues.

Prussian blue is a colour very apt to bind, and is rendered soft with more difficulty than carmine and lake. The same method of preparation to be followed with this, as directed with respect to lake, only it is necessary to grind a large quantity of the pure colour, as it is chiefly used for painting draperies. The different tints may be made according to necessity. Blue verditer is a colour naturally gritty, and therefore it is necessary to make it well. Its particles are so coarse as to require some binding matter to unite them, otherwise the crayons will never adhere together. To accomplish this, take a quantity sufficient to form two or three crayons, to which add a piece of flaked plaister of Paris, about the size of a pea; mix these well together and form the crayons upon a chalk. This blue is extremely brilliant and will be of great use in heightening draperies, &c. The tints must be formed with whitings as directed in the former instances, and are highly serviceable in painting flesh, to produce those pearly tints so beautiful in crayon pictures. It is not necessary to mix the compound with spirit, as clear water will be sufficient.

Greens.

Brilliant greens are produced with great difficulty. In switzerland they have a method of making them far superior to ours. We usually take yellow ochre, and, after grinding it with spirit, mix it with the powder of Prussian blue; then temper it with a knife, and lay the crayons on the chalk without rolling them. Instead of this, some use King's yellow mixed with Prussian blue, and others brown ochre with Prussian blue. The crayons made of the two last may be rolled. Various tints may be produced by these colours, according to fancy or necessity; some to partake more of the blue, and others of the yellow.

Yellows.

King's yellow is the most useful and the most brilliant, levigated with spirit of wine, to compose the different tints as before directed. Yellow ochre, and Naples yellow ground with spirits, will produce useful crayons. Orange is produced with King's yellow and vermilion ground together, and the tints formed as in other cases, but no great quantity of them is required.

Browns.

Cullen's earth is a fine dark brown. After six or eight of the simple crayons are prepared, several rich compound tints may be prepared from it, by a moisture of carmine, of various degrees. Black carmine, and this colour, mixed together, make useful tints for painting hair; several gradations may be produced from each other of these by a mixture with whiting. Roman, or brown ochre, is an excellent colour, either simple or compounded with carmine. Whiting, tinged in several degrees with either of these, will prove very serviceable in painting. Umber may be treated in just the same manner, only it is necessary to levigate with spirit of wine.

Purples.

Prussian blue ground with spirit and mixed with pulverized lake, will produce a good purple. Carmine thus mixed with Prussian blue, will produce a purple somewhat different from the former. Various tints may be made from either of these compounds, by a mixture with whiting.

Black.

Lamp-black is the only black that can be used with safety, as all others are subject to mildew, but as good lamp-black is very scarce, the student will, perhaps, find it most expedient to make it himself; the process of which is as follows: Provide a tin cone, fixed over a lamp, at such a height that the flame may just reach the cone for the soot to gather within it. When a sufficient quantity is collected, take it out and burn all the grease from it, in a crucible. It must then be ground with spirits, and laid on the chalk to absorb all the moisture. Various grey tints may be formed from this by a mixture with whiting, as mentioned in former instances. Vermilion mixed with carmine: this is a composition of great use, and tints made from this with whiting, will be found to be very serviceable. Carmine and black is another good compound, of which five or six gradations should be made, some partaking of the black, and others having the carmine most predominant, besides several tints by a mixture with whiting. Vermilion and black is also a very useful compound, from which several tints should be made. Prussian blue and black, is another good compound, and will be found of singular service in painting draperies.

It is impossible to lay down rules for the forming of every tint necessary in composing a set of crayons, there being many accidental compositions, entirely dependant upon fancy and opinion. The student should make it a rule to save the leavings of his colours, for of these he may form various tints, which will occasionally be useful.

The different compositions of colours must be cut into a proper magnitude, after they are prepared, in order to roll into pastils, for the convenience of using them. Each crayon should be formed in the left hand, with the ball of the right, first formed cylindrically, and then tapering at each end. If the composition is too dry, dip the finger in water; if too wet, the composition must be laid on the chalk again, to absorb more of the moisture. The crayons should be rolled as quick as possible; and when finished, must be laid on the chalk again, to absorb all remaining moisture. After the gradation of tints from one colour is formed, the stone should be scraped and well cleaned with water, before it is used for another colour.

Arrangement of the crayons.

When the set of crayons is completed, they should be arranged in classes, for the convenience of painting with them. Some thin drawers, divided into a number of partitions, is the most convenient method of disposing them properly. The bottom of the partitions must be covered with bran, as a bed for the colours, which will preserve them clean and unbroken. The box made use of when the student paints, should be about a foot square, with nine partitions. In the upper corner on the left hand (supposing the box to be on the lap when he paints,) let him place the black and grey crayons, those being the most seldom used; in the second partition, the blues; in the third, the greens and browns; in the first petition on the left hand of the second row, the carmines, lakes, and vermilions, and all deep reds; the yellows and orange in the middle, and the pearly tints next; and as these last are of a very delicate nature, they must be kept very clean, that the gradation of colour may be easily distinguished; in the lower row let the first partition contain a fine piece of linen rag, to wipe the crayons with while they are using; the second, all the pure lake and vermilion tints: and the other partition may contain those tints which, from their complex nature, cannot be classed with any of the former.

TO PAINT ON IVORY, AND MINIATURE PAINTING.

To prepare ivory for miniatures.

Take the ivory leaves, or tables on which the painting is to be made, and having cleansed them, rub them over with the juice of garlic.

This takes off that greasiness which is so much complained of, as preventing the colours from taking on the ground, and which is not otherwise to be remedied by the use of soap, or even gall.

Another method.

Ivory is never sold in a state sufficiently polished or white. The process of whitening must be done by placing it in a moderately heated oven, or in the sun, which will warp one side; turn it then on the other, and when it has the degree of whiteness required, take it out, that it may not become too dry; for in that case it loses its transparency, and is apt to split when cut. This operation finished, proceed to the polishing. Some painters use a large scratcher; others, an instrument, with a blade three or four inches long, and of a triangular shape. To either of these, the use of a razor is preferable; to benefit completely by it, be sure it has not the smallest notch in it, or that it be not too sharp. Open it so that the back part of the blade touches the handle; in that way use it to scrape the ivory from angle to angle. When the whole is thus polished, begin again from the contrary angles, in order that no traces of the saw may remain upon the side required to be painted. Having provided pounce-stone, pulverized and passed through a silk sieve, place the ivory in the middle of the bottom of a hand box, holding it firm with one hand, while with the other, take a small bit of paper, and rub the pounce on the side of the ivory which has been polished; being always careful to do it with a circular movement.

If the ivory be now of a dead white, and has lost the shine given to it by the razor, take it out of the box, holding it so that the fingers do not touch the surface, so troublesome to prepare and brush off lightly with a painting brush any grits that may have adhered to it; for this purpose, take one of the largest hair-pencils; it may be serviceable to remove in the same way, any specks or dust while painting.

Never suffer the fingers to touch the ivory; hold it always at the extremities for the colour will not settle in a place touched by the hands. If, however, such an accident happens, have recourse to the pumice-powder, and with a paper stump, rather pointed, gently rub the place affected. But, to avoid, as much as possible, a recurrence of such accidents, when at work, take a sheet of paper to rest the hand upon, and when there is occasion to use body-colour, have a piece of wood or pasteboard made for the same purpose, in such a way that it touch not the miniature: for in consequence of the gum which is in the colours, the heat of the hand might cause the paper to stick to the painting. The ivory at last prepared, begin the work by placing it on the desk, in the middle, with a sheet of paper under it and the sketch above.

To soften ivory.

Slice half a pound of mandrake, and put it into a quart of the best vinegar, into which put the ivory; let it stand in a warm place for 48 hours, and the ivory may be bent in any direction.

Manner of sketching.

Begin by attacking the strongest shades of the head; it is only when perfectly sure of the form of the four features, that the pupil may try to express the exterior shape of the head, and the wave of the hair. Endeavour, while indicating carefully the form, not to render the lines too hard. If, when painting the eyes, the lids are marked by too strong an outline, it will be very difficult to soften it afterwards. The same may be observed relative to the eye-lashes, and the shade of the nose and chin: begin by sketching them lightly; observe if they are exactly of the same colour and shape as those of the model; then go over them several times, till they have acquired the necessary strength.

In order to succeed upon what the pupil is now employed, (suppose it to be the head of an old man painted by Greuse) take care at first to use only warm colours, and do not till afterwards employ those grey tints which are perceived at the edge of the middle tints, towards the side approaching the light, otherwise the shades would not be sufficiently transparent. Be very careful to preserve the lights, particularly those which are placed upon the upper part of the cheeks, the extremity of the nose, and the forehead.

There are some painters who make use, with success, of a pen-knife, to scratch out the colour, but it requires skill, and the edge of the blade must only be employed, avoiding to touch with the point: it is better to proceed carefully, to be obliged to add colour rather than take it off. Work by etching; endeavour to place them at equal distances the one from the other. that they may as nearly as possible denote the forms of the flesh, and the motions of the muscles.

If, notwithstanding these precautions, the colour is found too thick, in some parts, or in consequence of taking too much water in your brush, some clotted strokes are perceived, use the point of the brush, dipped in water, tinged with the slightest quantity of colour, in order to dissolve it without entirely taking it away. It is essential, also, to avoid working too long upon the same spot, for fear of disturbing the colours already put on.

Colours to be employed.

The principal shades of the head are made with bistre, mixed with burnt sienna, and in some places with *precipite*, or a mixture of lake and lamp-black. The middle tints are made with yellow ochre, ultramarine, and very little of the mixture above-mentioned. The flesh-tints are made with red brown, upon which touch with a small quantity of orange-lake. The green tints near the mouth and neck, are made with yellow-ochre, ultramarine, and a little lake. The grey hairs of this old man are prepared in the shades with tints of bistre and black: in the middle tints, with ultramarine, to which add some *precipite.*

The eye-balls are made with burnt sienna and bistre; it would be well to make use of indigo for their outlines. In the white of the eyes there are ultramarine, black, and lake; make the mouth with brown-red mixed with lake and ultramarine. For the mouth of a woman, or young man, one may employ with good effect, a little vermilion in the under lip, as it usually is of a higher colour. At present, it will be sufficient to touch the corners with burnt sienna and lake.

Colours to be used in sketching a woman's head.

Be careful to put scarcely any bistre in the shades, but make them with the same colours as those already named for the middle tints of the old man, namely, ochre, ultramarine, and *precipite;* the local shades of the flesh are made with orange-lake, which must be enlivened in the parts most highly coloured with pure lake, and even a little vermilion. Make the middle tints with a slight mixture of lake, ochre, and ultramarine. Sketch the mouth with lake and vermilion, and retouch the upper-lip with a little red-brown, ultramarine, and *precipite;* put also a small quantity of ultramarine in the cast shadow of the upper-lip, and slightly heighten the corners of the mouth with a touch of yellow-ochre, or burnt sienna mixed with lake.

In painting the neck and breast do not lose sight of the local tint of the flesh, which must be done with orange-lake: let the shading be very transparent; wash in well the contours; try to round them in placing the etching nearer to each other towards the edge, being careful not to lose the original form. If the woman's hair is of a bright chesnut, in order to give this colour, sketch it with bistre, mixed with a little black; put also a mixture of carmine, lake, and lamp-black in the strongest shades, and after having carefully preserved the lights, go over them with water coloured with very little ochre. There is nothing in nature lighter, more transparent, or more uncertain, than hair; therefore, endeavour to study and express it accordingly. Make the extremities harmonize with the back-ground, and do not begin the latter till the head be in some degree of forwardness. Sketch it boldly, but with light tints, and work upon them as equally as possible. The blue parts are made with ultramarine, then add, in those that are grey, some black, and a little *precipite.* Work it over with tints of burnt sienna in the auburn parts, then harmonize the whole with one single tint to finish it: that is to say, if the general effect be too blue, employ black for that purpose; if too black, use blue; and if too cold, and some yellow. As to the dress, which is muslin, employ lake mixed with yellow ochre and ultramarine. Put some glazing of Indian yellow in the reflected light, and shade with sienna, lake, and a little black.

Use and advantage of body-colours.

The use of body-colours is absolutely necessary in painting in miniature for those that are desirous of producing much effect. It would be nearly impossible to make a good copy of a painting in oil, without employing them; besides which, for those who are become proficient in the use of them, they possess the great advantage of enabling them to paint faster. Before making use of these colours it is necessary to know them; the following is the list.

French colours.—English colours.

Blanc leger, Light white.—*Ochre jaune*, Yellow ochre.—*Vere de rut*, Roman ochre.—*Orpin jaune*, Yellow orpiment.—*Orpin rouge*, Red orpiment.—*Terre de sienne brulee*, Burnt sienna.—*Brun rouge*, Light or Indian red.—*Vermillon*, Vermilion.—*Laque*, Lake.—*Precipite-Violet*, Mixture of carmine, lake with indigo.—*Carmin*, Carmine.—*Indigo*, Indigo.—*Blue de Prusse*, Prussian blue.—*Bistre*, Bistre.—*Terre de Cologne*, Cologne earth.—*Noir de bougie*, Lamp-black.—*Gomme gutte*, Gamboge.—*Verd de Vessie*, Mixture of sap-green with permanent green.

In colouring flesh, the lights are only obtained by the assistance of the transparency of the colours, and the natural whiteness of the ivory; with body-colours, on the contrary, it is entirely covered, and the relief can only be produced by the use of colours more or less luminous.

To cut and paste the ivory.

Cut the ivory according to the form desired for the picture before beginning to paint with body-colours; for this purpose make use of scissars, and take care always to direct the points towards the centre from which ever side the pupil is cutting, in order to prevent the ivory from splitting; then paste it upon a sheet of very white pasteboard, of a thickness proportioned to the size of the miniature.

For this purpose use paste extremely white, such as is made with starch; then leave it under a press for some hours. Some painters use sheets of silver, which they place between the ivory and the pasteboard, to give brilliancy to the painting; but the effect produced by this is very trifling, and frequently turns out in the end very bad, as this metal is subject to become stained. When there is a back-ground, or a drapery to paint in body-colours, begin by making a mixture upon the *palette*, approaching as nearly as possible to the general tint of the object intended to represent, observing, however, that it is better to sketch with too dark than too light a tint, for it is always easier to add to the lightness than to the darkness of a body-colour. Avoid wetting the pencil more than is absolutely necessary for spreading the colour. It is better to use a little more in making the mixture than for spreading it upon the ivory; but be very careful not to begin painting till it evaporates a moment, as the painting will be better and quicker done if the colour employed be sufficiently dry.

To sketch portraits on ivory.

Take for the model the picture of a man boldly drawn, but, at the same time, finished. Choose a dark man, because black hair is more easily expressed upon a back-ground done with body-colour. Procure before-hand a glass of the same size as the model, if you wish to preserve the copy; and when the sketch is finished, use the same glass to trace the form of the picture upon the ivory, with the assistance of a leaden pencil. Be very careful to trace in such a manner, as that the head may be in every direction at the same distance from the oval, as it is in the model. In painting from nature, the pupil will perceive the importance of placing the head in its proper place, in order to give grace to the picture. It should approach more or less to the border at the top, according to the height of the person, but in no case should it ever touch, and there should always be at least the distance of two parts, equivalent to the half of the head.

Now carefully sketch the head, attentively examining the model, to know what colours to use; but while endeavouring to render the work neat and even, do not put the etchings too close, or be in too great a hurry to finish. In finishing too soon, the pupil is frequently obliged to go again over the painting with large touches, in order to give it strength; the colour in consequence becomes heavy, and the shades are rarely transparent. Sketch the hair with black, mixed with bistre, then touch it in certain parts with pure black; and, in finishing, spread some glazings of lake and lamp-black, and burnt sienna, with a great deal of gum. For the back-ground take a large pencil, with which make a mixture on the palette of body-colours with white, black, ochre, and Cologne earth, to which add a slight quantity of indigo. Then compare the effect of this mixture with the back-ground of the model, and if it is the same, take a pencil of squirrel's hair, with not too large a point, and spread carefully round the head and shoulders the colour of the back-ground. Endeavour as little as possible to alter the masses of hair, or the contour of the shoulders. Now use a larger pencil for the purpose of spreading the colour with wide short etchings placed one beside the other.

When this work has become perfectly dry, go over it in the same manner, but without ever passing twice over the same spot, for fear of taking it off. Continue doing this until the ivory no longer appears in any part. If any unevenness or thickness be perceived, caused by dust falling from the colours, or the inequality of the work, (as soon as the back ground is perfectly dry) use the flat side of the blade of a scratcher, in order to smooth it. To imitate the variety of colours in the model, bring forward the head, and give transparency and vagueness to the back-ground: make a greyish tint with white, black, and a small degree of ochre: take a very little of this in a large pencil, being careful to pass it over a piece of paper, or upon the corners of the ivory, that there may not remain too much colour; then touch with confidence, but lightly, the parts of the back-ground which approach to the head.

In consulting the model the pupil will discover if it be necessary to go over it again. Touch the other parts with glazings of ochre, or burnt sienna, always mixed with a little white, to be able to manage them. These last strokes must be given boldly, using scarcely any thing but water coloured, keeping as near as possible to the tint. To make the coat, which is blue, use indigo, lake, and a little white for the local tint; for the shades black and indigo, with a little gum. Add to the local tint rather more white and touch the lights with it, using for that purpose a smaller pencil. To prevent the outline of the coat from appearing too hard upon the back-ground, touch the edges with slight glazings made with the colours employed for both. Endeavour to avoid, particularly in female pictures, letting the back-ground of body colour touch the extremities of the flesh; but fill up this space with etchings, made with the colour of the back-ground a little lightened; it is the only method of harmonizing the carnations with body-colour. In order to finish the hair, the preparation of which is already explained, and the lights of which are of body-colour, make a mixture composed of white, indigo, red-brown, and ochre, then touch with it the locks of hair, where lights have been reserved, very slightly, and with a pencil nearly dry; add then a little white to the same mixture, and make use of it to give another touch to the masses that rise the most. To represent the small locks which are made upon the back-ground, and give lightness, employ a colour rather paler than that of the hair, otherwise it will appear much too dark upon the body-colour, and will want the transparency which is always found in nature.

Use of the magnifying glass.

In miniature painting the magnifying glass is of great use: in the first place, to find out in the model the method of colouring, employed by the master intended to copy: secondly, to give to the work the necessary finish, and touch accurately some parts of the head, and at times the accessories. What is done without the magnifier is always softer; made it a rule to have recourse to it only when the naked eye perceives nothing more to be done.

Procure also a little bottle of gum arabic dissolved in water, with a quantity of sugar candied equivalent to a fourth part of the gum; this preparation is of the utmost necessity to mix the colours before putting them on the palette, for it will happen that in painting, and above all in using body-colour, it will be required for some particular touches.

To execute light hair.

Draw the mass as correctly as possible, covering it over with a general tint, without, however, losing the contours. Make this tint with a little yellow ochre, black, and a small quantity of lake; prepare the shades with black ultramarine, and bistre, dot them with tinged water, preserving always the lights, and finish them as much as possible; retaining, however, their transparency: were the light parts to be covered too much, they would become heavy when touching them with body colour. When the hair is in a state of forwardness, that is to say, when by finishing it, it becomes very transparent and very silky, then take a short camel-hair pencil, and make a mixture of yellow ochre and white, with which touch the light you have left undone. Add a little more to this same mixture, in order to do the stronger lights; then touch the chief shades with bistre, lake with lamp-black, and a great deal of gums.

To represent velvet and satins of different colours.

Black velvet.

In order to make a black velvet, first cover the ivory with a local tint made of lamp-black, with very little gum, and as smooth as possible; denote the shades with black mixed with indigo and a little more gum; make the lights with a mixture of black and blue, with half the quantity of gum, to which add a little brown red and yellow ochre. Be very careful, with the assistance of a mixed tint, to blend the darker with the lighter shades: then add a little white to this same tint; and touch the lights with it as freely as possible: to finish, do over the shades with mixed black, indigo, *precipité*, and as much gum as possible, then pass over smoothly the reflected lights with lake, vandyke brown, or burnt sienna.

Violet velvet.

Take some indigo and carmine to cover the ivory as equally as possible, avoiding with care to make thicknesses, then draw the shades over it with some black, carmine, and more gum than in the local tints; for the last touches, make use of carmine and white, with half the quantity of gum mixed with a little white and carmine, to touch the lights; then harmonize the shades with a little *violet precipité* with a great deal of gum if the lights are too raw, smooth them over with a little carmine and lake, with much gum.

Green velvet.

Green velvet is made with a preparation of Prussian blue and red orpiment, well and smoothly laid on; the shades are drawn with black and *precipité*, then some white and Prussian blue, with a little gum, is used to mark the lights; the whole is then touched with the finest sap-green. The strong lights may again be touched with a mixture of white, ultramarine, but very slightly, with sap-green.

Red velvet.

To make red velvet, mix a local tint of carmine with a little red brown; use this mixture with great care, only doing it over again when thoroughly dry, that colour being very difficult to use as body colour; indicate the shades with *precipite* and gum; for the strongest parts mark the lights with pure carmine and afterwards touch those most brilliant with pure white, then again glaze them lightly with carmine.

The models copied will show you sufficiently the manner in which to place the light on the velvets; yet it will be useful to point out that this drapery is only brilliant in the reflected lights, and that it is different in its effects from all others.

White satin.

It is very difficult to produce the effect of white satin with body colour; it would be better attained by dotting the shades, the middle tints, and touching the lights with a little white. To obtain the desired effect, it is necessary, at first, to indicate with exactness the folds of the drapery; to make the silvery middle tints that are seen in it, take a little ultramarine, very litle lake, and a touch of yellow ochre; for the strongest parts use Indian yellow, black, and ultramarine. Be particular in making the shades of the satin partake of the tints of the objects around it. When thus sketched, prepare the lights with some white and a little gum which smooth as much as possible; finish the middle tints with the same colour used to begin them, only adding a little ultramarine, and the most brilliant lights with white without gum, the shades with bistre, ultramarine, and *precipite.*

Coloured satins, as well as many other silk draperies, may be done with body-colour.

To paint white feathers.

Outline the shape and the wave with care, then sketch them in with ultramarine, ochre, and a touch of lake; dot them lightly over, without attending at first to the minutiæ, after which mark out the more massy shades, by the addition of a little black to the first tint; then, with care, begin to put in the white and lightly indicate the little particles of the feather which hang over the back ground or the drapery; with the point of a stronger pencil mark out the lines of the body of the feather, being careful to avoid roughness; touch the strongest shades with *precipite*, and do the lights with white without gum.

To gild in body-colours.

Where there is an embroidery or some other gilding to do over a drapery or body coloured ground, draw the outline of it with Roman ochre, and sketch with the same tint; do the middle tints with bistre and burnt sienna, the lights with yellow ochre and white; then dot the shades with *precipite*, and a little bistre; in these last touches there should be a great deal of gum. The more powerful lights are done with white mixed with a little gamboge.

To make the same gilding with dots, prepare them with a simple wash of pure burnt sienna, and do it over in the manner above mentioned.

To execute linen, lace, and gauze.

The difficulty of painting linen is extreme, and every attention ought to be paid to it. The shades of white draperies always partake of the colour of the ground and surrounding objects; white not being considered as a colour, it would be all black, were they not to be reflected by other objects from which they borrow their colouring. Muslin, because of its transparency, partakes much of the colour of the flesh which it is near, and more particularly when it covers it; this drapery requiring little light, the shades of it consequently should be very soft.

Laces, blond, and gauzes are made over the objects they are to decorate; the lights are dotted with brilliant white; and the under colours are used for the shades; it should border on the yellow, that being the predominant colour of these draperies. For instance, if you wish to make a lace or blond trimming over a violet-coloured gown, and the folds of the trimming approach the flesh, the tint in that case should be of a red grey—when over the dress of a violet grey; because then the tint becomes mixed and partakes of the colour of the flesh, the gown, and the blond, the shades of which are grey.

To represent pearls upon the flesh, hair, &c.

If the pupil has a pearl necklace to make, draw the outline of each pearl with ultramarine, then make the shade with a little burnt sienna and ultramarine, the reflected lights with ochre, the cast shadow upon the flesh with burnt sienna, softening the extremities with some ultramarine: the middle tint on the side of the light is made with ultramarine, and the light is touched with white. Be careful to proportion the strength of the shading to the size of the pearl.

When pearls are to be made either upon the hair, above the back-ground, or upon draperies, where the pearl is to be placed, first, with a wet pencil, take the under colour off, until the ivory, which answers the purpose of local tint, appear; then make the pearls with the tints above mentioned, being careful, however, particularly if they be rather large, to make them partake in the reflected parts of the objects which surround them.

Colours to be employed in sketching a portrait from nature.

We shall now give some rules upon the properties and the employment of the colours, advising the pupil, at the same time, not to make the application of them until he feels convinced that nature indicates it. Sketch boldly; place the etchings, as much as possible, at equal distances from each other, and make them in such a manner as to show the movement of the muscles, and the form of the features. In the shades, use some lustre and burnt sienna, mixed with a little *precipite.* The grey tints are done with ultramarine and *precipite;* the green tints with yellow ochre, ultramarine, mixed more or less with lake, to heighten them and make them brighter. The local tints of the flesh must always be chosen from the model, and serve in a greater or less degree to modify all the others. Observe in painting the eyes, that the ball being transparent, and the light passing through it, ought to be rather less dark on the opposite side to the white speck. However, endeavour not to commit the fault, so common to all beginners in painting from nature—that of never giving sufficient vigour to the eye-balls. In Vandyke, particularly in his portraits of women and children, the colour of the eye-balls is much stronger than any of the shades of the head; this is one of the means employed, with success, to give at the same time, expression and softness to the physiognomy. To make the pupil or black spot, make use of black, and a little *precipite.* The edge of the eye-lid is made with bistre, mixed with red *precipite.* If the person whose portrait is painting, has a florid complexion, replace the bistre with yellow ochre mixed with lake.

The white of the eye is made with ultramarine, pure near the ball; in the corners, add a little ochre and lake; in men's heads, employ on the shaded side a small quantity of bistre, black, and *precipite;* which is heightened, if necessary, with a glazing of burnt sienna. Observe, that the setting of the eyes towards the extremities of the lids, and the lid itself, is generally of a violet tint, which must however be heightened with a little yellow ochre, and to which vigour may be given, in certain heads, by a touch of bistre, mixed with *precipite.* The lower part of the face is almost always of a greenish shade, mixed with lake. The shadow cast by the head upon the neck, is nearly of the same tint, although stronger and warmer in certain parts, which will be discovered by consulting the model.

The chin in women, is nearly of the same tint as the cheeks in the parts most highly coloured. It is the same in men, with this exception, that it is of a stronger tint, and there must be added to it, as well as to all the lower part of the face, a greater part of the ultramarine, to indicate the using of the beard. The mouth is the greatest difficulty for all beginners, not so much for the colouring, as for the form and expression. They generally place it too far from the nose, in consequence of the serious and wearied expression frequently to be found in the countenance of the model while sitting. In endeavouring to remedy this evil, they raise the corners, and believe by this means that they produce a smile, which is never natural but when the eyes, nose, and all the muscles of the face partake of this expression. The upper lip ought always to be of a stronger tint, but of a less brilliant colour than the under one. They are, generally, both of a very lively colour, and modelled in young persons, in a determined manner, while in old men, the relaxation of their forms, and the loss of their original colour, scarcely allows them to be distinguished from the local tint of the flesh. The corners of the mouth are made with a mixture of carmine, lake, ultramarine, and raw sienna. The last shadow of the under lip is made with nearly the same tint, adding to it a little touch of bistre. Observe that the reflect of the chin, is of a brighter and warmer tint than that of the top of the cheek, particularly where the bosom is uncovered. It ought, in every other instance, without losing the tint of the flesh, to partake more or less of that of the drapery which surrounds it.

When beginning the hair, observe that its shade upon the flesh has always a warmer tint, with a bluish edge. There is also a greyish tint at the rise of the hair upon the forehead, which must be indicated, otherwise the flesh will appear too abruptly cut. It is the same with the eye-brows, which appear, at the extremity of the temple, of a pinker colour, and must be blended with the flesh at the opposite extremity by a greyish tint. Many painters use too much lake at the extremity of the nose; it produces a disagreeable effect to the sight, and destroys the charm of the portrait. To avoid this, sketch this part lightly with the local tint which nature presents, and model it with tints more or less grey. In portraits of women, the middle tints on the side of the light, which are perceived upon the bosom and arms, are made with a slight mixture of ochre, ultramarine, and lake; on the shaded side add yellow ochre, sometimes red *precipite* and bistre, in particular where the back ground is deeply coloured. The local tint of the hands ought to be the same as that of the flesh; the nails are rather more violet; the ends of the fingers pink.

The shadow cast by the hand upon the flesh, is made with brown mixed with ultramarine and *precipite*. The cast shadow is always stronger than the shades of the fingers or the hand that occasions it, and must always be separated from it by a reflected light. Generally speaking the reflected parts ought to have more strength than the middle tints, but less than the shades.

To adjust the drapery.

We shall now proceed to the accessories of a portrait: these consist of the drapery, the back-ground, and many objects which may be introduced and infinitely varied according to the subject represented. They should be subordinate in colour, light, and effect, to the head, which must, in preserving the same energy and the same truth, unceasingly attract the sight and observation.

The manner of adjusting the drapery, contributes more than is generally believed by portrait painters, to give animation and character, and even expression, to their figures. Raphael, the model of perfection in every style, has taught us, that the draperies are intended to cover, but not to hide, the forms. The large folds ought always to be placed on the largest parts of the body. If the nature of the drapery requires small folds, give them but little relief, in order that they may yield in effect to those which indicate the principal parts. Denote the curved folds at the bending of the joints, and it should be the form underneath which determines those of the drapery. Place also, larger folds upon the projecting parts, than upon the receding ones, and be careful never to indicate two folds of the same size and form beside each other.

All the great masters succeeded in expressing by the drapery, not only the exact forms of their models at the moment taken, but even discovered, by their scientific execution, the position in which they were placed the instant before. In order to produce this effect, study it in nature; never begin to dress until the principal lines of it are drawn from the person sitting: afterwards it may be adjusted upon a lay figure, the immobility of which, will allow the effect to be more easily represented. This machine, made use of by almost all painters, resembles a skeleton in its construction; it even expresses the movements, by the assistance of balls placed in the joints: it is stuffed with horse-hair, covered with knitting, and is made in imitation of the interior forms of the human figure. After dressing it in the drapery intended to copy, place it exactly in the same situation and the same attitude as those of the model. Then, attentively examine if the folds it offers resemble those which were presented by nature. If this be not the case, remedy it as much as possible, by making this figure perform some movements of the body and arms, and then (lightly with the finger) arranging the folds into which the drapery falls in the most natural manner, and following, as far as possible, the rules just given.

The execution of the draperies has great influence on the harmony of a portrait, not only from the colour and variety of tints, but also from the becoming arrangement of the folds, the distribution of the light, and the blending of the light with the shade. There are colours that agree together, others that are injurious to each other; in general, strong contrasts, produced by opposing colours, or bright lights and strong shades abruptly brought together, offend the sight, and are contrary to the laws of harmony. A portrait-painter, notwithstanding the very little latitude usually allowed him, ought, however, to endeavour to follow these laws as near as he possibly can, and for this purpose, avail himself of the advantage which he can obtain from the arrangement of the folds, the *chiaro oscuro*, and the expression of the reflected lights.

To execute the back ground.

In the composition of the back-ground, the opinion of the artist is usually of much importance in the mind of the person painted. The colours employed in this will offer many resources for giving effect to the head and drapery, and to correct the general aspect of them, when that is necessary. If the portrait require colour and relief, and the vigour of it is not increased, for fear of destroying the resemblance, then make a bright back-ground, of a greyish tint mixed with blue: this will contribute to bring it forward, and make it appear more animated. If, on the contrary, the head be of too high a colour, by the assistance of a warm and deep-coloured back-ground, an aspect may be given it more resembling that of nature. However simple may be the back-ground, it is thought right to adopt, it must on no account be of an equal shade throughout, and it is highly essential, by the variety of the primitive tints and glazings by which they are covered, to produce some difference in the tints, particularly around the head. This will give space and uncertainty, detach the head, and give it roundness.

Primitive colours and their combinations.

We have confined ourselves to indicating 12 combinations of the principal colours of the flesh, and, in reality, we might confine ourselves to 4, for with black, blue, red, yellow, and reserving the lights upon the ivory, we might succeed in making all the mixtures necessary for miniature painting.

The history of the fine arts teaches that the eminent masters executed for a length of time with only red, blue, and yellow, which are the three primitive colours, black being only the abstraction from light, and white the light itself. A learned German, named Mayer, has calculated that with the three primitive colours, modified more or less with black and white, we might produce by their different combinations, eight hundred and nineteen tints. We have, then, reason to believe that the Greeks, who have left us such beautiful masterpieces in sculpture, had reached an equal degree of perfection in painting.

Discovery of new substances by modern painters.

Modern painters having discovered in nature substances which presented, ready prepared, the same mixture which the ancients were obliged to seek for upon their palettes, have increased their number of materials for painting, and have furnished artists with newer and speedier means of acquiring perfection in their art.

There have, however, been painters, who, since these discoveries have thought they might dispense with making use of them. Santerre, a French artist, living at the commencement of the last century, was one of these. He voluntarily confined himself to the five colours used by the ancients. Notwithstanding this, his productions were remarked for their soft and pleasing colouring ; the only substances he employed were ultramarine, massicot, red, brown, French white, and Polish black. This proves, that it is not the great variety of tints upon the palette which produces fine colouring, but the manner of employing them.

Manner of laying the body colours on the palette.

When the pupil is desirous of renewing the colours upon the palette, or of putting on fresh, remember, that ochres, raw sienna, brown, bistre, black, vermilion, and ultramarine, require to be ground again, and to have gum : habit can alone give a just idea of the degree necessary. Lake, carmine lake, and *precipite*, are generally sold with gum ; experience will teach whether in sufficient quantity, but there is no harm in grinding them as much as possible.

In laying the body-colour on the palette, put a large quantity of each, and let there be only three or four at most on one side of the palette, in such a manner as to leave room for the mixtures. Grind them as much as possible, and add a moderate quantity of gum. We only make use of light white for miniature painting, the white of lead being subject to become black from the effect of the air. Put some of this white into two different places : one of these quantities with much less gum, will serve to go a second time over the lights which are prepared with the other, in order to render them more brilliant. Some painters, who wish to give more solidity to the back ground and draperies in body-colours, put more gum in the first sketch : this precaution is unnecessary, when the ivory is properly prepared : but, in order to succeed in painting in body colours, they must not have too much gum. When the pupil has finished, and has been able to express all that he was desirous of executing, with the assistance of glazings of a warm tint he may make that grey and earthy aspect, which it so often presents, disappear.

Different substances used in miniature painting.

Miniature painting can be executed upon several kinds of white substances, such as marble, alabaster, and even egg-shell : artists have succeeded in preparing and softening the latter by means of humidity ; they may then be easily spread upon a plate of metal, or a thick sheet of pasteboard, after which they are susceptible, as well as ivory, of receiving the preparation already explained. The paper and Bristol paste-board, used for the acquarelles cannot be chosen too fine or too even ; as they then require no other preparation than that of the agate-stone. Vellum, which must be carefully stretched upon paste-board, or a plate of metal, may be lightly pounced.

Ivory has generally been adopted in preference to any of these substances, because it is subject to fewer inconveniences, and in its local tint comes nearer to that of the flesh itself ; and because it is capable of receiving a higher finish, and of being executed upon with greater vigour, and consequently, produces works of longer duration. It ought to be chosen extremely white, without apparent veins, very even, and cut in very thin sheets ; because, in proportion to its thickness, its opacity will give it a yellow tint, when otherwise, if it be transparent, the whiteness of the paper or pasteboard it is placed upon, will penetrate and increase that which is natural to it.

Choice of brushes.

It is extremely important to know how to make a judicious choice of pencils : those for the back ground ought to be square at the end, short and thick ; they must be dipt in water, and then be tried upon paper to see if they remain united, and if there be not one hair longer than the others. The pencils of squirrel's hair, made for sketching, ought not to be too long, their points should be round and firm. The sable pencils must be full of hair: the colour will not then dry so quickly, and in consequence render the touch larger and softer; the points should be firm, supple, and elastic. In order to be assured of this, wet them, and turn them in every direction upon the finger, or upon paper: if they make but one point, it may then be concluded that they are good; if, on the contrary, they do not unite well, or that some hairs are longer than others, in that case they are good for nothing. The pupil may, however, still make use of a pencil too pointed, (provided the hair remains united) by cutting them with scissors, but be very careful not to do it too much. A sure method of making a proper point is by wetting it, and passing it rapidly through the flame of a wax taper.

Most miniature painters have a habit of passing their pencils between the lips while painting, in order to unite the hair and make a good point; if there be too much water, they, by this means, draw it from the pencils, and leave only sufficient to enable them to employ the colour with softness. There is no fear of this being injurious, for all colours used in miniature painting, when prepared (except the orpiment, which is a poison,) have no bad qualities, or disagreeable taste. This last mentioned dangerous colour, does not make a part of the flesh palette, therefore it will be better to employ this method for the purpose of making the work even, and prevent its being too much loaded with colour. In painting with body colour, gather only the hair of the pencil, and if there be too much colour, discharge it upon paper, or upon the palette itself. In short, it will only be after having bought both bad and good pencils, that the pupil will be able to discover those most favourable to his own particular manner.

TO PAINT ON VELVET.

Materials required.

Best white cotton velvet, or velveteen. Box of water colours. *Assiette rouge*, or saucer of pink dye. Towne's alumina. Velvet scrubs. Fitch pencils of different sizes. Small saucers to contain the diluted colours.

Subjects for the same.

Flowers, as the rose, demand peculiar attention; likewise fine ripe fruits, large and beautiful shells, and the charming tints of the feathered tribe, &c.

Animals, especially the lion, tiger, leopard, &c. may be imitated with great fidelity. In landscapes choose from artic scenery, without attending to the minuteness of figures.

In the selection of subjects, ever prefer those that admit of the broadest light and shade; attempt first the most simple, as a flower or two: the facility with which they may be completed, will prepare and encourage for greater works.

Appropriate colours.

Reds.—Lake, carmine, vermillion, light red, and assiette rouge.

Blues.—Prussian, indigo, Antwerp, verditer.

Yellows.—Gamboge, yellow and Roman ochre.

Terra de sienna, burnt and unburnt.—Umber, do. do.—Vandyke brown.—Bistre.—Lamp-black.—Indian ink.

Compound colours.

Neutral tint, compounded of lake, indigo, and lamp-black.

Green, compounded of Prussian blue and gamboge in various shades, or with raw terra de sienna, or with burnt terra de sienna.

Purple, of Prussian blue, or indigo, with lake or carmine.

Orange, of gamboge with carmine, Roman ochre with vermilion, yellow ochre with red lead, the two siennas with light red.

Brown, of umber, lake, and lamp-black, different shades, (a deep shade) of lake or carmine, with lamp-black or Indian ink.

Directions to paint on velvet.

The only preparation velvet requires is, the making it perfectly smooth by passing over the back of it a warm iron.

Fitch pencils should be cut almost to a point, in the same manner as the velvet scrubs. Except for very large pieces, the former are preferable to the latter, being sufficiently strong to force the colour into the velvet, without injuring the foil.

The subject being chosen, it will be requisite for those who are not proficient, to trace in the same by attaching it to the velvet, and holding both against a window, making a neat and faint outline with a black lead pencil; but as velvet does not admit the same correction as paper, great care must be taken at first to obtain a correct outline, by tracing the subject with any smooth round point, the impression thus will also be left on the velvet.

Dilute the colours with alumin, except the pink dye, carmine, and lake; with those use lemon juice, particularly the pink dye, which is preferable to any other colour for the red rose.

In diluting the colours make them of a creamy consistence; in the same manner prepare in saucers the requisite compounds from the primitive colours.

The *assiette rouge* is an exception to this direction. With a fitch and lemon juice wash some of it from the saucer into smaller ones, in shades from the faintest tinge to the deepest hue of the rose.

Lay in the drawing with the faintest colouring. By this means the design will be seen at one view, and so correct any little inaccuracy by the subsequent shades. Observe in this stage to rub the colour well into the velvet with the scrubs or large fitcher, then let the work dry, and if the velvet is not well saturated with the colour, repeat the operation, but by no means in this stage attempt a great depth of colouring.

Proceed with the shadows, lay them with a fitch forming the flowers, or any other subject, as accurately as possible, softening off the edges of the shadows when necessary, according to the size of the design, either with a scrub or fitch, before the work gets too dry.

Before proceeding any further, the drawing should be well examined, the shadows deepened, and the light heightened as they may require; correct the whole, and add the finishing tints; then vein the leaves.

For large flowers, especially the rose, damp the back of the velvet moderately to assist the colouring through; wherever there is a large surface to be covered, this mode will be found advantageous.

Towards the extremities of the design and forming any part of the outline, do not let the fitch be too full of colour, but rather drier than the other parts; attention to this point will preserve the drawings perfectly neat and correct.

Be careful that the scrubs and fitches be kept perfectly clean, otherwise they will injure the brilliancy of the drawing, a fault it will be in some cases impossible to correct on velvet.

Have always ready some clean fitches to take off any super-abundance of colour, also for blending the colour while wet.

To paint on silks, satins &c.

When the outline is made, lay on a wash of isinglass with care, to take away the glare of the satin; otherwise the colours will not work freely. Melt the isinglass thin in very clear water, over the fire, otherwise it will discolour the satin, and spoil the colours.

The lights are to be made by a small tincture of the colour of the intended flower, mixed with the flake white, so as just to make a degree from the colour of the satin; if white, or of any other colour, to be mixed proportionably to the colour of the flower. If a blue flower, use a very small quantity of bice or verditer with the white, using less of it as the shades grow darker; and in the most dark, use indigo alone, it being by that time rendered opaque enough; but take care not to lay the colours on too thick, otherwise they will crack. A little white sugar-candy will be found necessary, when mixed with the gum water, as a preventive to cracking. If a flower happens to be of so deep a colour as not to admit of any pure white in the lightest of the parts, a sort of priming of white should be laid on; after which, when dry, begin with the ground-colour of the flower, and proceed gradually with the shades, with any selected examples, peculiarly chosen from nature, for that purpose.

LITHOGRAPHY.

To write and engrave upon stone.

The stones should be of a calcareous nature, pure, hard, and of a fine grain. They must imbibe both moisture and grease with equal avidity. The chalk is a composition of grease, wax, shell-lac, soap, and black. The lithographic ink is composed of the same materials, but rather softer.

The stone must be rubbed down with fine sand, to a perfect level, after which it is ready to receive the drawing: a weak solution of nitric acid should be thrown over the stone. This operation will slightly corode its surface, and dispose it to imbibe moisture, with more facility. While the stone is still wet, a cylinder of about three inches in diameter, and covered with common printer's ink, should be rolled over the whole surface of the stone. While the wet part refuses to take the ink, the chalk, being greasy, will take a portion of it from the roller. The stone is then ready for printing.

The press consists of a box drawn by a wheel, under a wooden scraper, pressing on it with great power. After the first impression, the stone must be wetted afresh, again rolled over with the cylinder, drawn under the scraper, and so on.

The same process is employed for ink drawings, except that the solution of aqua-fortis must be stronger, and the printing ink stiffer.

Imitations of wood cuts are produced by covering the stone with lithographic ink, and scraping out the intended lights. As the finer touches may be added with a hair pencil, prints far superior to wood cuts may be obtained, but the chief advantage of wood cuts, that of printing them, at the same time with the text of the book, is lost.

Engraving upon stone is performed by polishing the stone, and covering it with a thin coating of gum and black.

The part intended for the drawing must be scraped out, and when finished, of course, it appears white, instead of black. The thicker lines, as in copper, must be cut deeper, and when the whole is finished, the stone should be rubbed with linseed oil, which not being able to penetrate the coating of gum, will only touch the stone, where it is scraped away.

Three different methods of printing from stone.

In the chemical printing office at Vienna, three different methods are employed, but that termed in relief, is most frequently used. This is the general mode of printing music.

The second method, is the sunk, which is preferred for prints.

The third method is the flat, that is, neither raised nor sunk. This is useful for imitating drawings, particularly where the impression is intended to resemble crayons. For printing and engraving in this method, a block of marble is employed, or any other calcareous stone that is easily corroded, and will take a good polish. It should be two inches and a half thick, and of a size proportioned to the purpose for which it is intended. A close texture is considered as advantageous. When the stone is well polished and dry, the first step is to trace the drawing, notes, or letters to be printed with a pencil; the design is not very conspicuous, but it is rendered so by passing over the strokes of the pencil a particular ink, of which a great secret is made. This ink is made of a solution of lac in potash, coloured with the soot from burning wax, and appears to be the most suitable black for the purpose. When the design has been gone over with this ink, it is left to dry about two hours. After it is dry, nitric acid, more or less diluted, according to the degree of relief desired, is poured on the stone, which corrodes every part of it, except when defended by the resinous ink. The block being washed with water, ink, similar to that commonly used for printing, is distributed over it by printer's balls; a sheet of paper disposed on a frame is laid on it, and this is pressed down by means of a copper roller, or copper press.

The sunk, or chalk method, differs from that termed relief only in having stone much more corroded by the nitric acid. In the flat method less nitric acid is used. It is not to be supposed that the surface is quite plain in this way, but the lines are very little raised so that they can scarcely be perceived to stand above the ground, but by the finger.

Process for printing designs with porcelain plates.

Lithography offers to draughtsmen, the means of multiplying original designs at pleasure; but it carries with it great difficulties for the impression. If the stones are defective, if the workman is not clever, and has not had long experience, the designs are speedily impaired. It is then generally to be wished, that lithography might be rendered more simple, that the traits may not grow larger, and that it may be easy to clean the parts of the stone not occupied by the drawing. *M. Langlois*, porcelain manufacturer at *Bayeux*, has discovered a peculiar composition which gives him the method of tracing with the pencil, and of fixing by a second dressing, designs on the porcelain plates covered with enamel, and of rendering the traits sufficiently rough to retain the ink in the impression, whilst the enamel is washed that surrounds them. By this method proofs may be multiplied to infinity, without impairing the designs, and traits extremely sharp, fine grains, and even smooth tints may be obtained.

To apply lithography to wood engraving.

The stone should be covered with a fat varnish, which may easily be removed with an engraver's point. Then let the stone be hollowed out or *bit*, as copper is done, with aqua fortis, so as to produce however, a contrary effect, for the traces of the design, instead of being hollow, are here in relief. The traces should be afterwards worked up and repaired, and the hollow part dug still deeper, so as to be out of the reach of the printer's ball. In this state, the stone will resemble an engraving on wood, and may, in case of necessity, answer the same purpose, but it would not have the same solidity. It may be used, however, as a matrix for casting metal plates, presenting the adverse of the impression, and with the relief being now hollow, may themselves serve to cast new matrixes, in every respect similar to the stone. By this means, an endless number of impressions may be taken, because the materials themselves may be multiplied.

The invention is of advantage, not only for vignettes and figures to be inserted in the text, but also for imitating exactly, Turkish or Chinese characters, &c. It may also be applied to printing of paper.

To make lithographic pencils.

Mix, the following ingredients:

Soap 3 ounces, tallow 2 ounces, wax 1 ounce.

When melted smooth, add a sufficient quantity of lamp black, and pour it into moulds.

To take impressions on paper from designs make in stone.

The stone should be close grained, and the drawing or writing, should be made with a pen dipped in ink, formed of a solution of lac, in leys of pure soda, to which some soap and lamp-black should be added, for colouring. Leave it to harden for a few days; then take impressions in the following manner: Dip the surface in water, then dab it with printer's ink and printer's balls. The ink will stick to the design and not to the stone, and the impressions may be taken with wet paper, by a rolling or screw press, in the ordinary way. Several hundred copies may be taken from the same design, in this simple manner.

Cheap substitute for lithographic stone.

Paste-board, or card paper, covered with an argillo-calcareous mixture, has been employed with complete success, and effects a great saving. The material is to be reduced to a powder, and laid on wet; it sets, of course, immediately, and may be applied to a more substantial article than paper, and upon a more extensive scale than the inventor has yet carried it to. This coating receives the ink or crayon in the same way that the stone does, and furnishes impressions precisely in the same manner.

TO PAINT AND STAIN GLASS AND PORCELAIN.

To paint upon glass is an art which has generally appeared difficult; yet there is no representation more elegant than that of a mezzotinto painted in this manner, for it gives all the softness that can be desired in a picture, and is easy to work, as there are no outlines to draw, nor any shades to make.

The prints are those done in mezzotinto: for their shades being rubbed down on the glass, the several lines which represent the shady part of any common print are by this means blended together, and appear as soft and united as in any drawing of Indian ink.

Provide such mezzotintos as are wanted; cut off the margin; then get a piece of fine crown glass, the size of the print, as flat and free from knots and scratches as possible; clean the glass, and lay some Venice turpentine, quite thin and smooth, on one side, with a brush of hog's hair. Lay the print flat in water, and let it remain on the surface till it sinks, it is then enough; take it carefully out, and dab it between some papers, that no water may be seen, yet so as to be damp.

Next lay the damp print with its face uppermost upon a flat table: then hold the glass over it, without touching the turpentine, till it is exactly even with the print, let it fall gently on it. Press the glass down carefully with the fingers in several parts, so that the turpentine may stick to the print; after which take it up, then holding the glass towards you press the prints with the fingers, from the centre towards the edges, till no blisters remain.

When this is done wet the back of the paint with a sponge, till the paper will rub off with the fingers; then rub it gently, and the white paper will roll off, leaving the impression only upon the glass; then let it dry, and, with a camel's hair pencil, dipped in oil of turpentine, wet it all over, and it will be perfectly transparent and fit for painting.

Improved method.

The first thing to be done, in order to paint, or stain glass in the modern way, is to design, and even colour the whole subject on paper. Then choose such pieces of glass as are clear, even, and smooth, and proper to receive the several parts. Proceed to distribute the design itself, or the paper it is drawn on, into pieces suitable to these of the glass; always taking care that the glasses may join in the contours of the figures, and the folds of the draperies; that the carnations and other finer parts may not be impaired by the lead with which the pieces are to be joined together. The distribution being made, mark all the glasses, as well as papers, that they may be known again: which done, apply every part of the design upon the glass intended for it: and copy or transfer the design upon this glass with the black colour diluted in gum-water, by tracing and following all the lines and strokes that appear through the glass, with the point of a pencil.

When these strokes are well dried, which will be in about two days, (the work being only in black and white,) give it a slight wash over with urine, gum-arabic, and a little black; and repeat this several times, according as the shades are desired to be heightened, with this precaution, never to apply a new wash till the former is sufficiently dried. This done, the lights and risings are given by rubbing off the colour in the respective places with a wooden point, or by the handle of the pencil.

The colours are used with gum water, the same as in painting in miniature, taking care to apply them lightly, for fear of effacing the outlines of the design; or even for the greater security, to apply them on the other side; especially yellow, which is very pernicious to the other colours, by blending therewith. And here too, as in pieces of black and white, particular regard must always be had not to lay colour on colour, till such time as the former is well dried.

When the painting of all the pieces is finished, they are carried to the furnace to anneal, or to bake the colours.

Colours proper to paint with upon glass.

The several sorts of colours, ground in oil for this purpose, may be had at all the capital colour shops, &c.

Whites.—Flake white, podium.

Blacks.—Lamp-black, ivory-black.

Browns.—Spanish brown, umber, spruce ochre, Dutch pink, orpiment.

Blues.—Blue bice, Prussian blue.

Reds.—Rose pink, vermillion, red lead, Indian red, lake cinnabar.

Yellows.—English pink, masticot pink, English ochre, Saunders blue, smalt.

Greens.—Verdigris, terra vert, verditer.

The ultramarine for blue, and the carmine for red, are rather to be bought in powders, as in that state they are less apt to dry; and as the least tint of these will give the picture a cast, mix up what is wanted for present use with a drop or two of nut oil upon the pallet with the pallet-knife.

To get the colour out, prick a hole at the bottom of each bladder, and press it till there is enough upon the pallet for use.

Then lay a sheet of white paper on the table, and taking the picture in the left hand, with the turpentine side next you, hold it sloping, (the bottom resting on the white paper,) and all outlines and tints of the prints will be seen on the glass; and nothing remains but to lay on the colours proper for the different parts, as follow:—

To use the colours.

As the lights and shades of the picture open, lay the lighter colours first on the lighter parts of the print and the darker over the shaded parts; and having laid on the brighter colours, it is not material if the darker sorts are laid a little over them; for the first colour will hide those laid on afterwards. For example:—

Reds.—Lay on the first red-lead, and shade with lake or carmine.

Yellows.—The lightest yellow may be laid on first, and shaded with Dutch pink.

Blues.—Blue bice, or ultramarine, used for the lights may be shaded with indigo.

Greens.—Lay on verdigris first, and then a mixture of that and Dutch pink. This green may be lightened by an addition of Dutch pink.

When any of these are too strong, they may be lightened, by mixing white with them upon the pallet; or darken them as much as required by mixing them with a deeper shade of the same colour.

The colours must not be laid on too thick; but, if troublesome, thin them before using them, with a little turpentine oil.

Take care to have a pencil for each colour, and never use that which has been used for green with any other colour, without first washing it well with turpentine oil, as that colour is apt to appear predominant when the colours are dry.

Wash all the pencils, after using, in turpentine oil.

The glass, when painted, must stand three or four days free from dust, before it is framed.

To draw on glass.

Grind lamp-black with gum water and some common salt. With a pen or hair pencil, draw the design on the glass, and afterwards shade and paint it with any of the following compositions.

Colour for grounds on glass.

Take iron filings and Dutch yellow beads, equal parts. If a little red cast is wanted, add a little copper filings. With a steel muller, grind these together, on a thick and strong copper-plate, or on porphyry. Then add a little gum arabic, borax, common salt, and clear water. Mix these with a little fluid, and put the composition in a phial for use.

When it is to be used there is nothing to do but, with a hair pencil, to lay it quite flat on the design drawn the day before; and, having left this to dry also for another day, with the quill of a turkey, the nib unsplit, heighten the lights in the same manner as with crayons on blue paper. Whenever there are more coats of the above composition put one upon another, the shade will naturally be stronger; and, when this is finished, lay the colours for garments and complexions.

To prepare lake for glass.

Grind the lake with water impregnated with gum and salt: then make use of it with the brush. The shading is operated by laying a double, treble, or more coats of the colour, where it is wanted darker.

Blue purple for the same.

Make a compound of lake and indigo, ground together with gum and salt water; and use it as directed in the preceding article.

Green.

Mix with a proportionable quantity of gamboge, ground together as above.

Yellow.

Grind gamboge with salt water only.

White.

Heighten much the white parts with a pen.

To transfer engravings on glass.

Metallic colours prepared and mixed with fat oil are applied to the stamp on the engraved brass. Wipe with the hand in the manner of the printers of coloured plates; take a proof on a sheet of silver paper, which is immediately transferred on the tablet of glass destined to be painted, being careful to turn the coloured side against the glass; it adheres to it, and as soon as the copy is quite dry, take off the superfluous paper by washing it with a sponge; there will remain only the colour transferred to the glass; it is fixed by passing the glass through the ovens.

The basis of all the colours employed in painting on glass are oxidated metallic substances.

In painting on glass it is necessary that the matter should be very transparent.

To prepare metallic calces, and precipitates of gold.

A solution of gold in aqua-regia, which is evaporated to dryness, leaves a calx of gold, which is used for glass, enamel, and porcelain gilding; or by precipitating the solution with green vitriol dissolved in water, with copper, or perhaps all the metals, a similar calx is produced. This calx is mixed with some essential oil, as oil of spike, and calcined borax, and the whole made to adhere *to the surface of the glass*, by a solution of gum arabic. It is then applied with a fine pencil, and burnt in under a muffle.

To prepare oxide of cobalt.

When regulus of cobalt is exposed to a moderate fire in the open air, it calcines, and is reduced to a blackish powder.

This calx vitrifies with vitrifiable matters, and forms beautiful blue glasses. Cobalt is, at present, the only substance known which has the property of furnishing a very fine blue, that is not changed by the most intense heat.

To prepare zaffre.

Zaffre is the oxide of cobalt, for painting pottery ware and porcelain of a blue colour. Break the cobalt with hammers into pieces about the size of a hen's egg: and the stony involucrum, with such other heterogenous matters as are distinguishable, separate as much as possible. Pound the chosen mineral in stamping-mills, and sift it through brass wire sieves. Wash off the lighter parts by water, and afterwards put it into a large flat-bottomed arched furnace, resembling a baking oven, where the flame of the wood reverberates upon the ore; which stir occasionally, and turn with long-handled iron hooks, or rakes; and the process is to be continued till its fumes cease. The oven or furnace terminates by a long horizontal gallery, which serves for a chimney; in which the arsenic, naturally mixed with the ore, sublimes. If the ore contains a little bismuth, as this semi-metal is very fusible, collect it at the bottom of the furnace. The cobalt remains in the state of a dark grey oxide and is called *zaffre.* This operation is continued four or even nine hours, according to the quality of the ore. The roasted ore being taken out from the furnace, such parts as are concreted into lumps, pound and sift afresh. Zaffre, in commerce, is never pure, being mixed with two or rather three parts of powdered flints. A proper quantity of the best sort of these, after being ignited in a furnace, are to be thrown into water, to render them friable, and more easily reduced to powder; which being sifted, is mixed with the zaffre, according to the before-mentioned dose; and the mixture is put into casks, after being moistened with water. This oxide, fused with three parts of sand, and one of potass, forms a blue glass: which, when pounded, sifted, and ground in mills, (included in large casks,) forms *smalt.*

The blue of zaffre is the most solid and fixed of all the colours employed in vitrification. It suffers no change from the most violent fire. It is successfully employed to give shades of blue to enamels, and to crystal glasses made in imitation of opaque and transparent precious stones, as the lapis lazuli, the turquoise, the sapphire, and others.

Purple precipitate of cassius.

Dissolve some pure gold in nitro-muriatic acid; add either acid, or metal, until saturation takes place. Now dissolve some pure tin in the same kind of acid; observe the same point of saturation as with the gold; and pour it into the solution of gold. A purple powder will be precipitated, which must be collected and washed in distilled water.

This beautiful purple colour, as before mentioned, is extremely useful to enamellers, and to glass stainers.

When brought into fusion with a clear transparent glass, it tinges it of a purple, red, or violet colour. Hence the method of making false rubies and garnets.

To paint coloured drawings on glass.

This art is exercised two ways. 1. Plates of stained glass are cut into the shape of figures, and joined by leaden outlines. On these plates a shading is afterwards traced by the painter, which gives features to the face, and folds to the drapery. 2. Vitrifiable colours are attached to plates of white glass, which are afterwards placed in the oven, and thus converted into a transparent enamelling. The first sort is cheaper, but the shading wears off, by the insensible corrosion of the atmosphere. The second sort defies every accident, except fracture, but the colour of the figures suffers in the oven. For small objects, the first sort, and for large objects, the second, as far as art is concerned, seems best adapted.

To paint or stain glass black.

The colours used in painting or staining glass, are very different from those used in painting either in water or oil colours.

For black, take scales of iron, 1 oz. scales of copper, 1 oz. jet, half oz. Reduce them to powder, and mix them.

To paint or stain glass blue.

Take fine white sand, twelve ounces, zaffre and minium, each three ounces; reduce them to a fine powder in a bell metal mortar, then put the powder into a very strong crucible, cover it and lute it well, and being dry calcine it over a quick fire for an hour; take out the matter and pound it; then to sixteen ounces of this powder, add fourteen of nitre powder; mix them well, and put them into the crucible again: cover and lute it, and calcine it for two hours on a very strong fire.

To paint glass carnation.

Take red chalk, 8 oz. iron scales and litharge of silver, each 2 oz. gum-arabic, half oz. Dissolve in water; grind altogether for half an hour till stiff, then put the compound in a glass, and stir it well, and let it stand for 14 days.

To paint glass green.

Take red lead, 1 lb. scales of copper 1 lb. and flint, 5 lbs. Divide them into three parts, and add to them as much nitrate of potass; put them into a crucible, and melt them by a strong fire; and when the mass is cold, powder it, and grind it on a slab of porphyry.

To paint glass gold colour.

Take silver, 1 oz. antimony, half oz. Melt them in a crucible, then pound the mass to powder, and grind it on a copper plate; add to it, yellow ochre, or brick-dust calcined again, 15 ounces, and grind them well together with water.

To paint glass purple.

Take minium, 1 lb. brown stone, 1 lb. white flint, 5 lbs. Divide them into three parts, and add to them as much nitrate of potass as one of the parts; calcine, melt, and grind the compound.

To paint glass red.

Take jet 4 oz. litharge of silver, 2 oz, red chalk, 1 oz. Powder them fine, and mix them.

To paint glass white.

Take jet, 2 parts, white flint, ground on a glass very fine, 1 part. Mix them.

To paint glass yellow.

Take Spanish-brown, 10 parts, silver-leaf, 1 part, antimony, half part. Put all into a crucible, and calcine them well.

TO COLOUR PAPER HANGINGS.

There are three methods of effecting this. The first by printing the colours; the second by using the stencil; and the third by laying them on with a pencil, as in other kinds of painting.

Printing the colours.

When the colours are laid on, the impression is made by wooden prints, which are cut in such a manner that the figure to be expressed is made to project from the surface, by cutting away all the other part, and this being charged with the colours properly tempered (by letting it gently down on the block on which the colour is previously spread,) conveys it to the ground of the paper, on which it is made to fall forcibly by means of its weight, and by the effort of the arm of the person who uses the print. There must be as many separate prints as there are colours to be printed.

Stencilling.

The manner of *stencilling* the colours is this: The figure, which all the parts of any particular colour make in the design to be painted, is to be cut out in a piece of tinned iron, thin leather, or oil-cloth; these pieces are called stencils; and being laid flat on the sheets of paper to be printed, spread on a table or floor, are to be rubbed over with the colour, properly tempered, by means of a large brush. The colour passing over the whole, is consequently spread on those parts of the paper where the tin, cloth, or leather is cut away, and give the same effect as if laid on by a print. This is, nevertheless, only practicable in parts where there are only detached masses or spots of colours; for where there are small continued lines, or parts that run one into another, it is difficult to preserve the connexion or continuity of the parts of the cloth, or to keep the smaller corners close down to the paper: therefore in such cases prints are preferable.

Pencilling.

Pencilling is only used in the case of nicer work, such as the better imitations of India paper. It is performed in the same manner as other paintings in water or varnish. It is sometimes used only to fill the outlines already formed by printing, where the price of the colour or the exactness of the manner in which it is required to be laid on, render the stencilling, or printing, less proper; at other times, it is used for forming or delineating some parts of the design, where a spirit of freedom and variety, not to be had printed in outlines, are desirable in the work.

To make flock paper hangings.

The paper designed for receiving the flock, is first prepared with a varnish ground with some proper colour, or by that of the paper itself. It is frequently practised to print some Mosaic, or other small running figure in colours on the ground, before the flock be laid on; and it may be done with any pigment of the colour desired, tempered with varnish, and laid on by a print cut correspondently to that end. The method of laying on the flock is this; a wooden print being cut, as above described, for laying on the colour in such a manner that the part of the design which is intended for the flock may project beyond the rest of the surface; the varnish is put on a block covered with leather, or oil-cloth, and the print is to be used also in the same manner, to lay the varnish on all the parts where the flock is to be fixed.

The sheet thus prepared by the varnished impression, is then to be removed to another block, or table, and to be strewed over with flock, which is afterwards to be gently compressed by a board, or some other flat body, to make the varnish take the better hold of it: and then the sheet is to be hung on a frame till the varnish be perfectly dry; at which time the superfluous parts of flock are to be brushed off by a soft camels'-hair brush, and the proper flock will be found to adhere in a very strong manner. The method of preparing the flock is by cutting woollen rags or pieces of cloth, with the hand, by means of a large bill or chopping knife; or by means of a machine worked by a horse-mill.

TO COLOUR MARBLE.

This is a nice art, and, in order to succeed in it, the pieces of marble on which the experiments are tried, must be well polished, and free from the least spot or vein. The harder the marble is, the better it will bear the heat necessary in the operation; therefore alabaster, and the common soft white marble, are very improper for performing these operations upon.

Application of heat.

Heat is always necessary for opening the pores of marble, so as to render it fit to receive the colours; but the marble must never be made red-hot; for then the texture of it is injured, and the colours are burnt, and lose their beauty. Too small a degree of heat is as bad as too great; for, in this case, though the marble receives the colour, it will not be fixed in it, nor strike deep enough. The proper degree is that which, without making the marble red will make the liquor boil upon the surface.

Menstruums to strike in the colours.

These must be varied according to the nature of the colour to be used. A lixivium made with horse's or dog's urine, with four parts of quick lime, and one of pot-ashes, is excellent for some colours; common ley of wood-ashes is very good for others; for some, spirit of wine is best; and lastly for others, oily liquors, or common white wine.

Colours.

The colours which have been found to succeed best with the peculiar menstruums, are these: stone-blue dissolved in six times the quantity of spirit of wine, or of the vinous lixivium, and litmus dissolved in common ley of wood-ashes. An extract of saffron, and that colour made of buckthorn berries, and called sap-green, both succeed well when dissolved in wine and quicklime. Vermilion, and a very fine powder of cochineal, also succeeds very well in the same liquors. Dragon's blood succeeds in spirit of wine, as does also a tincture of logwood in the same spirit. Alkanet-root gives a fine colour; but the only menstruum to be used with it is the oil of turpentine.

Dry and unmixed colours.

Besides these mixtures, there are other colours which must be laid on dry and unmixed: viz. dragon's blood of the finest kind, for a *red;* gamboge for a *yellow;* green wax for a *green;* common brimstone, pitch, and turpentine, for a brown colour. The marble for these experiments must be made considerably hot, and then the colours are to be rubbed on dry in the lump.

To give a fine gold colour.

Take crude sal ammoniac, white vitriol, and verdigris, of each equal quantities. Mix the whole thoroughly in fine powder.

To stain marble red or yellow.

The staining of marble to all degrees of red or yellow, by solution of dragon's blood or gamboge, may be done by reducing these gums to powder, and grinding them with the spirit of wine in a glass mortar. But for smaller attempts, no method is so good as the mixing a little of either of those powders with spirit of wine in a silver spoon, and holding it over burning charcoal. By this means a fine tincture will be extracted: and with a pencil dipped in this, the finest traces may be made on the marble while cold; which on the heating of it afterwards, either on sand, or on a baker's oven, will all sink very deep, and remain perfectly distinct on the stone. It is very easy to make the ground colour of the marble red or yellow by this mode, and leave white veins in it. This is to be done by covering the places where the whiteness is to remain with some white paint, or even with two or three doubles only of paper; either of which will prevent the colour from penetrating.

To give a blue colour.

Dissolve turnsole in lixivium, in lime and urine, or in the volatile spirit of urine; but a better blue, and used in an easier manner, is furnished by the Canary turnsole. This is only to be dissolved in water, and drawn on the place with a pencil: it penetrates very deeply in the marble; and the colour may be increased, by drawing the pencil whetted afresh several times over the same lines. This colour is subject to spread and diffuse itself irregularly: but it may be kept in regular bounds, by circumscribing its lines with beds of wax, or any such substance. It should always be laid on cold, and no heat given afterwards to the marble.

To prepare brimstone in imitation of marble. Provide a flat and smooth piece of marble; on this make a border or wall, to encompass either a square or oval table, which may be done either with wax or clay. Then having several sorts of colours, as white lead, vermilion, lake, orpiment, masticot, smalt, Prussian blue, &c. melt on a slow fire some brimstone in several glazed pipkins; put one particular sort of colour into each, and stir it well together; then having before oiled the marble all over within the wall, with one colour, quickly drop spots upon it of larger and less size; after this, take another colour and do as before, and so on till the stone is covered with spots of all the colours designed to be used. When this is done, consider next what colour the mass or ground of the table is to be; if of a grey colour, then take fine sifted ashes, and mix it up with melted brimstone: or if red, with English red ochre; if white, with white lead; if black, with lamp or ivory-black. The brimstone for the ground must be pretty hot, that the coloured drops on the stone may unite and incorporate with it. When the ground is poured even all over, next, if necessary, put a thin wainscot board upon it: this must be done while the brimstone is hot, making also the board hot, which ought to be thoroughly dry, in order to cause the brimstone to stick better to it. When the whole is cold, take it up, and polish it with a cloth and oil, and it will look very beautiful.

ENAMELLING.

The art of enamelling consists in the application of a smooth coating of vitrified matter to a bright polished metallic surface. It is, therefore, a kind of varnish made of glass, and melted upon the substance to which it is applied, affording a fine uniform ground for an infinite variety of ornaments which are fixed on by heat.

The only metals that are enamelled are gold and copper; and with the latter the opaque enamels only are used. Where the enamel is transparent and coloured, the metal chosen should not only have its surface unalterable, when fully red-hot, but also be in no degree chemically altered by the close contact of melted glass, containing an abundance of some kind of metallic oxide. This is the chief reason why coloured enamelling on silver is impracticable, though the brilliancy of its surface is not impaired by mere heat; for, if an enamel made yellow by oxide of lead or antimony, be laid on the surface of bright silver, and be kept melted on it for a certain time, the silver and the enamel act on each other so powerfully, that the colour soon changes from a yellow to an orange, and lastly to a dirty olive. Copper is equally altered by the coloured enamels so that gold is the only metal which can bear the long contact of the coloured glass at a full red heat without being altered by them.

To enamel dial plates.

A piece of thin sheet copper, hammered to the requisite convexity, is first accurately cut out, a hole drilled in the middle for the axis of the hands, and both the surfaces made perfectly bright with a brush. A small rim is then made round the circumference, with a thin brass band rising a little above the level, and a similar rim round the margin of the central hole. The use of these is to confine the enamel when in fusion, and to keep the edges of the plate quite neat and even. The substance of the enamel is a fine white opaque glass; this is bought in lump by the enamellers, and is first broken down with a hammer, then ground to a powder sufficiently fine, with some water, in an agate mortar; the superfluous water being then poured off, the pulverized enamel remains of about the consistence of wetted sand, and is spread very evenly over the surface of the copper plate. In most enamellings, and especially on this, it is necessary also to counter-enamel the under concave surface of the copper plate to prevent its being drawn out of its true shape by the unequal shrinking of the metal and enamel, on cooling. For this kind of work, the counter-enamel is only about half the thickness on the concave, as on the convex side. For flat plates, the thickness is the same on both sides.

The plate, covered with the moist enamel powder, is warmed and thoroughly dried, then gently set upon a thin earthen ring, that supports it only by touching the outer rim, and put gradually into the red hot muffle of the enameller's furnace. This furnace is constructed somewhat like the assay-furnace, but the upper part alone of the muffle is much heated, and some peculiarities are observed in the construction, to enable the artist to govern the fire more accurately.

The precise degree of heat to be given here, as in all enamelling, is that at which the particles of the enamel run together into an uniform pasty consistence, and extend themselves evenly, shewing a fine polished face; carefully avoiding, on the other hand, so great a heat as would endanger the melting of the thin metallic plate. When the enamel is thus seen to *sweat down*, as it were, to an uniform glossy glazing, the piece is gradually withdrawn and cooled, otherwise it would fly by the action of the cold air.

A second coating of enamel is then laid on and fired as before; but this time, the finest powder of enamel is taken, or that which remains suspended in the washings. It is then ready to receive the figures and division marks, which are made of a black enamel, ground in an agate mortar, to a most impalpable powder, worked up, on a pallet, with oil of lavender, and laid on with an extremely fine hair brush. The plate is then stoved to evaporate the essential oil, and the figure is burnt in as before. Polishing with tripoli, and minuter parts of the process, need not be here described.

To make the purple enamel used in the Mosaic pictures of St. Peter's at Rome.

Take of sulphur, saltpetre, vitriol, antimony, and oxide of tin, each, 1 lb. Minium, or oxide of lead, 60lbs.

Mix altogether in a crucible, and melt in a furnace: next take it out and wash it to carry off the salts; after melting in the crucible, add 19 ounces of rose copper, half an ounce of prepared zaffre, 1 ounce and a half of crocus martis, made with sulphur, 3 ounces of refined borax, and 1 lb. of a composition of gold, silver, and mercury.

When all are well combined, the mass is to be stirred with a copper rod, and the fire gradually diminished to prevent the metals from burning. The composition thus prepared is finally to be put into crucibles and placed in a reverberatory furnace, where they are to remain 24 hours. The same composition will answer for other colours, by merely changing the colouring matter. This composition has almost all the characters of real stone; and when broken, exhibits a vitreous fracture.—*Philosophical Mag.*

To make white enamel, for porcelain.

Mix 100 parts of pure lead with from 20 to 25 of the best tin, and bring them to a low red heat in an open vessel. The mixture then burns nearly as rapidly as charcoal, and oxidates very fast. Skim off the crusts of oxide, successively formed till the whole is thoroughly calcined.

Then mix all the skimmings, and again heat as before, till no flame arises from them, and the whole is of an uniform grey colour. Take 100 parts of this oxide, 100 of white sand, and 25 or 30 of common salt, and melt the whole by a moderate heat. This gives a greyish mass, often porous and apparently imperfect, but which however, runs to a good enamel when afterwards heated.

For metals and finer works.

The sand is previously calcined in a very strong heat with a fourth of its weight; or, if a more fusible compound is wanted, as much of the oxides of tin and lead as of salt are taken, and the whole is melted into a white porous mass. This is then employed instead of the rough sand, as in the preceding process.

The above proportions, however, are not invariable, for if more fusibility is wanted, the dose of oxide is increased and that of the sand diminished; the quantity of common salt remaining the same. The sand employed in this process is not the common sort, however fine; but a micaceous sand, in which the mica forms about one-fourth of the mixture.

New enamel for porcelain.

Melt together, pulverized feldspar, 27 parts, borax 18 parts, sand, 4 do. potash, nitre, and potter's earth, 3 parts each.

Then add 3 parts of borax reduced to fine powder.

From the trial which the society of Arts in London ordered to be made of this enamel, it hss been found superior to any hitherto known. It is easily and uniformly applied, and spreads without producing bubbles, or spoutings out; it neither covers nor impairs even the most delicate colours. It incorporates perfectly with them, and the porcelain which is covered over with it may pass a second time through the fire, without this enamel cracking or breaking out.

Material for opaque enamels.

Neri, in his valuable treatise on glass making, has long ago given the following proportions for the common material of all the opaque enamels, which Kunckel and other practical chemists have confirmed.—Calcine 30 parts of lead, with 33 of tin, with the usual precautions. Then take of this calcined mixed oxide 50 pounds, and as much of powdered flints (prepared by being thrown into water when red hot, and then ground to powder,) and 8 ounces of salt of tartar; melt the mixture in a strong fire to kept up for ten hours, after which reduce the mass to powder.

To make it white.

Mix 6 lbs. of the compound with 48 grains of the best black oxide of manganese, and melt in a clear fire. When fully fused, throw it into cold water, then re-melt and cool as before, two or three times, till the enamel is quite white and fine.

Rich red coloured enamel.

The most beautiful and costly colour known in enamelling, is an exquisitely fine rich red, with a purplish tinge, given by the salts and oxides of gold; especially by the purple precipitate, formed by tin in one form or other; and by nitromuriate of gold; and also by the fulminating gold. This beautiful colour requires much skill in the artist, to be fully brought out. When most perfect it should come from the fire quite colourless, and afterwards receive its colour by the flame of a candle.

Other, and common reds, are given by the oxide of iron; but this requires the mixture of alumine, or some other substance refractory in the fire, otherwise at a full red heat, the colour will degenerate into black.

To prepare the flux for enamelling on glass vessels.

Take of *saturnus glorificatus*, 1 lb. natural crystal, calcined to whiteness, 1-2 lb. salt of pulverine, 1 lb.

Mix them together, and bake in a slow heat for about 12 hours, then melt the mass, and pulverize the same in an agate mortar, or any other proper vessel, which is not capable of communicating any metallic or other impurity.

To prepare glorificatus.

Take litharge of white lead, put it in a pan, pour on distilled vinegar, stirring it well over a gentle fire till the vinegar becomes impregnated with the salt of the lead; evaporate half the vinegar, put it in a cool place to crystallize, and keep the crystals dry for use.

To make green enamel.

Take of copper-dust, 1 oz. sand, 2 oz. litharge, 1 oz. nitre, 1-2 oz. Or, copper, 2 oz. sand, 1 oz. litharge, 2 oz. nitre, 1 1-2 oz.

Mix them with equal parts of flux, to vary the proportions of them as may be found necessary, according to the tint of colour required.

Black enamel.

Take of calcined iron, cobalt, crude or prepared, each 1 oz. Or, zaffre, 2 oz. manganese, 1 oz.

Mix them with equal parts of flux, by melting or grinding together.

Yellow enamel.

Take of lead and tin ashes, litharge, antimony and sand, each 1 oz. nitre, 4 ounces.

Calcine, or melt them together; pulverize, and mix them with a due proportion of flux, as the nature of the glass may require; or take more or less of any or all of the above, according to the depth of colour desired.

Blue enamel.

Take of prepared cobalt, sand, red lead, and nitre, each 1 ounce, flint glass, 2 ounces.

Melt them together by fire, pulverized and fluxed according to the degree of softness, or strength of colour required.

Olive enamel.

Take of the blue as prepared above, 1 oz. black, 1-2 oz. yellow, 1-2 oz. Grind them for use. If necessary add flux to make it softer.

White enamel.

Take of tin, prepared by aqua-fortis, and red-lead, each 1 oz. white pebble stone, or natural crystal, 2 oz. nitre, 1 oz. arsenic, 1 drachm, with equal parts of flux, or more or less, as the softness or opacity may require: melt together, calcine, or use raw.

To make purple enamel.

Take the finest gold; dissolve it in aqua-regia, regulated with sal-ammoniac; put it in a sand heat for about 48 hours, to digest the gold, collect the powder, grind it with 6 times its weight of sulphur, put it into a crucible on the fire till the sulphur is evaporated; then amalgamate the powder with twice its weight of mercury, put it into a mortar or other vessel, and rub it together for about six hours, with a small quantity of water in the mortar, which change frequently; evaporate the remaining mercury in a crucible, and add to the powder 10 times its weight of flux, or more or less, as the hardness or softness of the colour may require.

Rose-coloured enamel.

Take purple as prepared above, mix it with 30 times its weight of flux, and 100th part of its weight of silver leaf, or any preparation of silver, or vary the proportion of the flux and silver as the quality of the colour may require; or any of the other preparations for purple will do, varying the proportions of the flux and silver as above; or any materials, from which purple can be produced, will, with the addition of silver and flux, answer.

Brown enamel.

Take of red lead, 1 ounce, calcined iron, 1 oz. antimony, 2 oz. litharge, 2 oz. zaffre, 1 oz. sand, 2 oz.

Calcine, or melt together, or use raw, as may be most expedient; or vary the proportions of any or all the above, as tint or quality may require.

Mode of application.

The preceding colours may be applied to vessels of glass in the following manner, viz. by painting, printing, or transferring, dipping, floating, and grounding.

By painting.

Mix the colours (when reduced by grinding to a fine powder) with spirits of turpentine, temper them with thick oil of turpentine, and apply them with camel-hair pencils, or any other proper instrument, or mix them with nut or spike oil, or any other essential or volatile oil, or with water, in which case use gum arabic, or any other gum that will dissolve in water, or with spirits, varnishes, gums of every kind, waxes, or resins; but the first is conceived to be the best.

By printing.

Take a glue bat, full size for the subject, charge the copper-plate with the oil or colour, and take the impression with the bat from the plate, which impression transfer on the glass: if the impression is not strong enough, shake some dry colour on it which will adhere to the moist colour; or take any engraving or etching, or stamp, or cast, and having charged it with the oil or colour, transfer it on the glass by means of prepared paper, vellum, leather, or any other substance that will answer; but the first is the best. Any engravings, etchings, stamps, casts, or devices, may be charged with waters, oils, varnishes, or glutinous matters of any kind, reduced to a proper state, as is necessary in printing in general; any or all of these may be used alone, or mixed with the colours. When used alone, the colour is to be applied in powder.

By dipping.

Mix the colour to about the consistency of a cream with any of the ingredients used for printing, in which dip the glass vessel, and keep it in motion till smooth.

By floating.

Mix the colour with any of the ingredients used for printing, to a consistency according to the strength of the ground required, float it through a tube, or any other vessel, moving or shaking the piece of glass till the colour is spread over the part required.

By grounding.

First charge the glass vessel with oil of turpentine, with a camel-hair pencil, and while moist apply the colour in a dry powder, which will adhere to the oil, or, instead of oil of turpentine, use any of the materials used for printing: but the first is the best.

Cautions to be observed in making coloured enamels.

In making these enamels, the following general cautions are necessary to be observed.

1st. That the pots be glazed with white glass, and be such as will bear the fire.

2d. That the matter of enamels be very nicely mixed with the colours.

3d. When the enamel is good, and the colour well incorporated, it must be taken from the fire with a pair of tongs.

General method of making coloured enamels.

Powder, sift, and grind all the colours very nicely, and first mix them with one another, and then with the common matter of enamels; then set them in pots in a furnace, and when they are well mixed and incorporated, cast them into water, and when dry, set them in a furnace again to melt, and when melted take a proof of it. If too deep coloured, add more of the common matter of enamels; and if too pale add more of the colours.

To obtain black enamel with platina.

Mix some chlorine of platina, dissolved in water, with neuter-nitrate of mercury, and expose the precipitate, which will be formed, to a heat simply sufficient to volatilize the protochlorine of mercury; there will be obtained a black powder, which, applied with a dissolvent or flux, gives a beautiful black enamel. —*Annales de Chimie.*

To make enamel, called niello.

Take 1 part of pure silver, 2 of copper, and 3 of pure lead, fuse them together, and pour the amalgam into a long-necked earthen ware matrass, half filled with levigated sulphur; let the mouth of the vessel be immediately closed, and the contents left to cool. The mass which results, when levigated and washed, is ready for the purposes of the artist. The cavities left by the fusion having been filled with it, the plate is to be held over a small furnace, fed with a mixture of charcoal and wood, taking care to distribute the enamel with the proper instrument. As soon as fusion has taken place, the plate is to be removed; and, when sufficiently cooled, is to be cleared by the file, and polished by fine pumice and tripoli.

To paint in enamel.

The enamel painter has to work, not with actual colours, but with mixtures, which he only knows from experience will produce certain colours after the delicate operation of the fire; and to the common skill of the painter, in the arrangement of his pallet and choice of his colours the enameller has to add much practical knowledge of the chemical operation of one metallic oxide on another: the fusibility of his materials; and the utmost degree of heat at which they will retain, not only the accuracy of the figures which he has given, but the precise shade of colour which he intends to lay on.

Painting in enamel requires a succession of firings: first of the ground which is to receive the design, and which itself requires two firings, and then of the different parts of the design itself. The ground is laid on in the same general way as the common watch face enamelling. The colours are the different metallic oxides, melted with some vitrescent mixture, and ground to extreme fineness. These are worked up with an essential oil (that of spikenard is preferred, and next to it oil of lavender) to the proper consistence of oil colours, and are laid on with a very fine hair brush. The essential oil should be very pure, and the use of this, rather than of any fixed oil, is, that the whole may evaporate completely in a moderate heat, and leave no carbonaceous matter in contact with the colour when red hot, which might affect its degree of oxidation, and thence the shade of colour which it is intended to produce. As the colour of some vitrified metallic oxides (such as that of gold) will stand at a very moderate heat, whilst others will bear, and even require a higher temperature to be properly fixed, it forms a great part of the technial skill of the artist to supply the different colours in proper order; fixing first those shades which are produced by the colours that will endure the highest, and finishing with those that demand the least heat. The outline of the design is first traced on the enamel ground and burnt in; after which, the parts are filled up gradually by repeated burnings, to the last and finest touches of the tenderest enamel.

Transparent enamels are scarcely ever laid upon any other metal than gold, on account of the discoloration produced by other metals. If, however, copper is the metal used, it is first covered with a thin enamel coating, over which gold leaf is laid and burnt in, so that, in fact, it is still this metal that is the basis of the ornamental enamel.

To manufacture Mosaic as at Rome.

Mosaic work consists of various shaped pieces of coloured glass enamel; and when these pieces are cemented together, they form those regular and other beautiful figures which constitute tessellated pavements.

The enamel, consisting of glass mixed with metallic colouring matter, is heated for eight days in a glass-house, each colour in a separate pot. The melted enamel is taken out with an iron spoon, and poured on polished marble placed horizontally; and another flat marble slab is laid upon the surface, so that the enamel cools into the form of a round cake, of the thickness of three-tenths of an inch.

In order to divide the cake into smaller pieces, it is placed on a sharp steel anvil, called tagliulo, which has the edge uppermost; and a stroke of an edged hammer is given on the upper surface of the cake, which is thus divided into long parallelopipeds, or prisms, whose bases are three-tenths of an inch square. These parallelopipeds are again divided across their length by the tagliulo and hammer into pieces of the length of eight-tenths of an inch, to be used in the Mosaic pictures. Sometimes the cakes are made thicker and the pieces larger.

For smaller pictures, the enamel, whilst fused, is drawn into long parallelopipeds, or quadrangular sticks; and these are divided across by the tagliulo and hammer, or by a file; sometimes, also, these pieces are divided by a saw without teeth, consisting of a copper blade and emery; and the pieces are sometimes polished on a horizontal wheel of lead with emery.

Gilded Mosaic.

Gilded Mosaic is formed by applying the gold leaf on the hot surface of a brown enamel, immediately after the enamel is taken from the furnace; the whole is put into the furnace again for a short time, and when it is taken out the gold is firmly fixed on the surface. In the gilded enamel, used in Mosaic at Rome, there is *a thin coat of transparent glass* over the gold.

ENGRAVING.

The different modes of engraving are the following:—

1. In strokes cut through a thin wax, laid upon the copper, with a point, and these strokes bitten or corroded into the copper with aqua-fortis. This is called *etching*.

2. In strokes with the graver alone unassisted by aqua-fortis. In this instance, the design is traced with a sharp tool, called a *dry point*, upon the plate; and the strokes are cut or plowed upon the copper with an instrument distinguished by the name of a *graver*.

3. In mezzotinto, which is performed by a dark ground being raised uniformly upon the plate with a toothed tool.

4. In aquatinta, the outline is first etched, and afterwards a sort of wash is laid by the aqua-fortis upon the plate, resembling drawings in Indian ink, bistre, &c.

5. On wood, performed with a single block.

6. On wood, with two, three, or more blocks. This mode of engraving is called *chiar' oscuro*, and was designed to represent the drawings of the old masters.

7. Engraving on steel.

Etching.

Etching is a method of working on copper, wherein the lines or strokes instead of being cut with a graver, are eaten with aqua-fortis.

Materials, &c.

The principal materials for this art are, the copper-plate, hard and soft ground, (the first for winter, and the other for summer,) a dabber, turpentine-varnish, lamp-black, soft wax, and aqua-fortis.

The tools are, an oil-rubber, a burnisher, a scraper, a hand-vice, etching-boards, etching-needles, an oil stone, and a parallel ruler.

To lay on the ground or varnish.

Having provided a plate of the size of the drawing intended to be copied, rub it well with an oil-rubber made of swan-skin flannel, till all the marks of the charcoal used in polishing it, entirely disappear; then, wipe off the dirty oil with a linen rag, dip the finger in some clean oil, and touch it over every part of the plate; after which, with the burnisher, polish the plate; and in case any sand-holes or flaws appear, the scraper will assist in taking them out. The marks left by the scraper are to be taken out by the burnisher till nothing appear. Having fixed the hand-vice at one end of the plate with a rag and whiting, clean the plate carefully from grease; then heat it over a charcoal fire, or lighted paper, lay the ground on thinly, and dab it all over with the dabber, till it is perfectly smooth and even; then warm the plate again, and, holding it up with the ground downwards, smoke it all over with a wax candle, taking care that the snuff of it does not touch the ground, and wave the candle continually over every part, so that the ground may not be burnt by heating it more in one place than another. If the plate be large, bind four wax tapers together.

To trace the outlines.

Rub the back part of the drawing all over with a bit of rag or cotton, dipt in the scrapings of red chalk, and shake off the loose dust, or wipe it off gently with a clean rag. Place the red side upon the plate, making it fast at each corner with a little bit of soft wax. Lay the etching board under the hand, to prevent bruising the ground; then with a blunt etching needle trace lightly the outlines and breadths of the shadows till the marks of them appear upon the ground, taking care not to penetrate it by tracing too hard.

As great nicety is required in this part of the work, it will be necessary now and then to lift up one corner of the original, and examine whether every part be traced before the taking it off, as it will be extremely difficult to lay it down again in its former position.

Directions for etching.

Having carefully traced the original, take it off, and lay a silk handkerchief next the plate, and over that the etching board; then proceed to the etching; for which, observe the following directions:—

Distances in landscapes, or the faint parts of any other picture, are the first to be done: and these are to be worked closer, and with a sharper pointed needle: The darker parts must be etched wider, and with a blunter needle; but to prevent mistakes, the needles may be marked according to their different degrees, and the uses for which they are intended. As for the very faintest parts of all they are to be left for the graver or dry needle.

In buildings, and all architecture in general, use a parallel ruler, till frequent practice enables the artist to do them well enough without.

The needles may, when necessary, be whetted upon the oil-stone, keeping them turning in the hand, so as to whet them equally all round. The oil-stone will be further useful in whetting the scraper, which is to be rubbed flat upon the stone, and with a steady hand, keeping oil constantly upon the stone.

To bite or eat in the work with aqua fortis.

Examine the work carefully and see that nothing is omitted; and if any scratches appear upon the ground, or mistakes be committed, stop them out, by covering them with a mixture of lamp-black and varnish, laid on thinly with a hair-pencil, which, when dry, will resist the aqua-fortis. It will be better, however, to stop these out, as they occur in the course of the work, as they will be less liable to escape notice; when the varnish is dry, etch it over again if required.

Then inclose the work with a rim or border of soft wax, about half an inch high, bending the wax in the form of a spout, at one corner, to pour off the aqua-fortis; take care to lay the wax so close to the plate that no vacancies be left.

The aqua-fortis must be single; and if too strong as will be seen in the biting, take it off, and mix it with a little water, shaking them together in a bottle; and when, by often using, it becomes too weak, it may be strengthened by mixing it with a little double aqua-fortis. The bottle which contains the aqua-fortis, should have a large mouth and a glass stopper.

Let the aqua-fortis lie on the plate a short time, wiping off the bubbles as they arise with a feather, which may remain upon the plate while it is biting; after which take it off, and wash the plate with water; then let it dry, and by scraping off part of the ground from the faintest part of the work, try if it be bit enough; and if not, stop out the part which has been tried with the lamp-black and varnish, and when that is dry pour on the aqua-fortis again.

When the faint parts of the work are bit enough, stop them out, and proceed to bite the stronger part, stopping them out as occasion requires, till the whole work is sufficiently bit; then warm the plate, and take off the soft wax: after which, heat the plate till the ground melts, pour on a little oil, and wipe the whole off with a rag. When the ground is taken off, rub the work well with the oil-rubber, and wipe the plate clean; then proceed to finish it with the graver.

Engraving tools.

The tools necessary for engraving are, the oil-rubber, burnisher, scraper, oil-stone, needles, and ruler, already mentioned to be used in etching, also gravers, compasses, and a sand bag.

Gravers are of two sorts, square and lozenge. Three of each sort should be provided. The first is used in cutting the broader strokes, the other for the fainter and more delicate ones. No graver should exceed the length of five inches and a half, the handle included, excepting for straight lines.

The sand-bag or cushion is used to lay the plate on, for the convenience of turning it about.

To whet and temper the graver.

As great pains are required to whet the graver nicely, particularly the belly of it, care must be taken to lay the two angles of the graver, which are to be held next the plate, flat upon the stone, and rub them steadily, till the belly rises gradually above the plate, so that when the graver is laid flat upon it, the light may be just perceived under the point, otherwise it will dig into the copper, and then it will be impossible to keep a point, or execute the work with freedom. Keep the right arm close to the side, and place the forefinger of the left hand upon that part of the graver which lies uppermost on the stone. When this is done, in order to whet the face, place the flat part of the handle in the hollow of the hand, with the belly of the graver upwards, upon a moderate slope, and rub the extremity or face upon the stone, till it has an exceeding sharp point. The oil-stone, while in use, must never be kept without oil.

When the graver is too hard, which may be known by the frequent breaking of the point, the method of tempering it is as follows:—

Heat a poker red-hot, and hold the graver upon it within half an inch of the point, waving it to and fro till the steel changes to a light straw colour; then put the point into oil to cool; or hold the graver close to the flame of a candle till it be of the same colour, and cool it in the tallow; but be careful either way not to hold it too long, for then it will be too soft; and in this case the point, which will then turn blue, must be broken off, whetted afresh, and tempered again, if required.

To hold the graver.

Hold the handle in the hollow of the hand, and extending the fore-finger down towards the point, let it rest upon the back of the graver, so as to hold it flat and parallel with the plate.

Take care that the fingers do not interpose between the plate and the graver, for they will prevent the artist from carrying the graver level with the plate, and from cutting the strokes so clean as they ought to be.

To lay the design upon the plate.

After polishing it fine and smooth, heat it so that it will melt *virgin wax*, with which rub it thinly and equally over, and let it cool. Then the design must be drawn on paper with a black lead pencil, and laid upon the plate with its pencilled side upon the wax ; press it to, and with a burnisher go over every part of the design ; then with a sharp-pointed tool, trace it through the wax upon the plate, take off the wax and proceed to work.

To engrave on copper.

Place the sand-bag on a firm table, or fixed board with the plate upon it ; and holding the graver as above directed, proceed to business in the following manner :—

For straight strokes, hold the plate firm upon the sand-bag with the left hand, moving the right hand forwards, leaning lighter where the stroke should be fine, and harder where it should be broader.

For circular or crooked strokes, hold the graver steadfast, moving the hand or the plate as most convenient. Carry the hand with such a sleight, that the stroke may be ended as finely as it was begun ; and if there is occasion to make one part deeper or blacker than another, do it by degrees, taking care that the strokes be not too close nor too wide.

In the course of the work, scrape off the bur or roughness which arises with the belly of the graver, but be careful in doing this, not to scratch the plate ; rub it with the oil rubber, and wipe the plate clean, which will take off the glare of the copper, and show what has been done to the best advantage. Any mistakes, or scratches in the plate may be rubbed out with the burnisher, and the part levelled with the scraper, polishing it again afterwards lightly with the burnisher.

The piece may now be finished by graving up the several parts to the colour of the original, beginning, as in etching, with the fainter parts, and advancing gradually with the stronger, till the whole is completed.

The dry needle (so called because not used till the ground is taken off the plate) is principally employed in the extreme light parts of water, sky, drapery, architecture, &c.

To prevent too great a degree of light, use a sash, made of transparent or fan-paper, pasted on a frame and placed sloping at a conveniet distance between the work and the light.

To engrave upon copper in alto relievo.

The new art of engraving upon copper which Mr. Lizars of Edinburgh has invented, is a substitute for wood engraving, in the same manner as lithography is a substitute for copper-plate engraving ; but while Mr. Lizars has given us a cheaper art for a more expensive one, he has also given us a more perfect art, for one which is full of imperfections.

In the common operation of engraving, the desired effect is produced by making incisions upon the copper-plate with a steel instrument of an angular shape, which incisions are filled with printing ink, and transferred to the paper by the pressure of a roller, which is passed over its surface. There is another mode of producing these lines or incisions by means of diluted nitrous acid, in which the impression is taken in the same way. Mr. Lizars' new method of engraving is done upon a principle exactly the reverse, for instead of the subject being cut into the copper, it is the interstice between the lines which is removed by diluted aqua-fortis, and the lines are left as the surface : from which the impression is taken by means of a common type printing *press*, instead of a copper plate press.

This is effected by drawing with common turpentine varnish, covered with lamp-black, whatever is required upon the plate, and when the varnish is thoroughly dry, the acid is poured upon it, and the interstice of course removed by its action upon the uncovered part of the copper. If the subject is very full of dark shadows, this operation will be performed with little risk of accident, and with the removal of very little of the interstice between the lines : but if the distance between the lines is great, the risk and difficulty is very much increased, and it will be requisite to cut away the parts which surround the lines, with a graver, in order to prevent the dabbler with the printing ink from reaching the bottom, and thus producing a blurred impression. It is obvious, therefore, that the more the plate is covered with work, the less risk will there be in the preparation of it with the acid, after the subject is drawn, and the less trouble will there be in removing the interstice (if any) from those places where there is little shading.

To make bordering wax for copper-plates.

Take one-third of bees wax, and two-thirds of pitch ; melt them in a pipkin or iron ladle, and pour them into luke-warm water. When well mixed, and the water is squeezed out, form it into rolls of convenient size.

When wanted for use, it must be put into luke-warm water to soften it, and render it easily worked by the hand. When sufficiently pliable, it must be drawn out into long rolls, and put round the edges of the plate, from half an inch high. Mould a spout at one corner to pour off the aqua-fortis.

Another method.

Melt bees-wax with a small portion of Venice turpentine and tallow, until it becomes of a proper consistency.

This is used for placing round the plate about an inch high, previously to pouring on the aqua fortis. At one corner a spout or gutter should be made for the purpose of pouring off the aqua fortis, when the etching is sufficiently bit in.

To make Rembrandt's white varnish for engraving.

Take of virgin-wax, one ounce, of mastic, half an ounce, of calcined asphaltum, or of amber, half an ounce. Pound the mastic and asphaltum separately in a mortar; put the wax into a new earthenware pot well glazed, and place it over a fire, till the wax be melted; then sprinkle in, by little and little, the mastic and asphaltum, and stir the mixture well together till the whole be incorporated. Pour the melted matter afterwards into clean water, and form it into a ball which must be kept for use.

In using this varnish, it is proper to take particular care of three things. The first, not to heat the plate too much when the varnish is put upon it. The second, to lay the first coat of varnish as thin as possible, in order to be able to spread the white varnish upon it, without rendering the whole of too great a thickness: The third, to omit blackening this varnish with smoke, as is done with the common; but when it is become entirely cold, take a piece of white lead, and having ground it extremely fine, temper it with gum water; and then, with a pencil, lay a coat of it very thinly and equally over the whole plate. This is the manner in which Rembrandt varnished his plates.

Callot's soft varnish.

Take of virgin-wax, four ounces, of amber, (or of the best asphaltum calcined,) and of mastic, each two ounces, of resin, common pitch, or shoe-maker's wax, each one ounce, and of varnish, or turpentine, half an ounce. Having prepared all these ingredients, take a new earthen-pot, and put it over the fire, with the virgin-wax in it; and when that is melted, add gradually to it the pitch; and afterwards the powders, stirring the mixture each time in proportion to the addition made to it. When the whole is sufficiently melted and mixt together, take the pot from the fire, and having poured the mass in an earthen vessel, full of clean water, form it into balls, by working it with the hands, and keep them in a box, free from dust, for use.

The two ounces of mastic are to be used only in summer, because it hardens the varnish, and preserves it from being cracked by the engraver's leaning over the plate during the graving; but in that designed for winter, only one ounce should be put.

Salmon's soft varnish.

Take of virgin-wax, four ounces, asphaltum, two ounces, amber and mastic, each one ounce.

The preparation is much the same as for the preceding, only caution should be used that the fire be not too strong, as the varnish will otherwise, be apt to burn. This varnish is only for summer use, and would be too hard for winter.

Excellent Parisian soft varnish.

Take of virgin-wax, and of asphaltum, or Greek pitch, each one ounce; of black pitch, half an ounce, and of Burgundy pitch, a quarter of an ounce. The asphaltum must be pounded in a mortar, and the wax melted over a slow fire, in a pot of glazed earthen-ware; and the rest of the ingredients added little by little, stirring the mixture accordingly, till the whole be well melted and incorporated; and taking care that the matter be not suffered to burn. Afterwards throw the whole mass into an earthen vessel full of clean water, and knead it with the hands, to form it into little balls; and then roll them up in new strong taffety for use.

Another soft varnish.

Take of virgin-wax, two ounces and a half, of Burgundy pitch, three ounces, of resin, half an ounce, asphaltum, two ounces, and turpentine, one penny-worth: this varnish is very good, and well approved. The preparation is the same as that of those already given.

Lawrence's soft varnish.

Take of virgin-wax and asphaltum, each two ounces, of black pitch and Burgundy pitch, each half an ounce. Melt the wax and pitch in a new earthen-ware glazed pot, and add to them, by degrees, the asphaltum finely powdered. Let the whole boil till such time, as that taking a drop upon a plate, it will break when it is cold, on bending it double three or four times, betwixt the fingers; the varnish being then enough boiled, must be taken off the fire, and having been suffered to cool a little, must be poured into warm water, that it may work the more easily with the hands, so as to be formed into balls, which must be wrapt in taffety for use.

It must be observed, first, that the fire be not too violent, for fear of burning the ingredients; a slight simmering will be sufficient: 2dly, that while the asphaltum is putting in, and even after it is mixt with them, the ingredients should be stirred continually with a spatula; and 3dly, that the water, into which this composition is thrown, should be nearly of the same degree of warmth with it, to prevent a kind of cracking that happens when the water is too cold.

The varnish ought always to be harder in summer than in winter, and it will become so, if it be suffered to boil longer, or if a greater proportion of the asphaltum or brown resin be used.

To apply soft varnish to copper-plates.

The plate being well polished and burnished, also cleansed from all greasiness, by chalk or Spanish white, put it upon a chafing-dish, in which there is a moderate fire, observing to hold it so that it may not burn. It is to be left over the fire, till it be so hot that the varnish, being brought in contact with it, may melt. Then take some of the soft varnish well wrapt up in taffety, that is free from all grease and dirt, and also strong and sound in every part. With this rub the plate, fixed over the fire till it grow hot. In doing this, it should be gently passed from one side to the other in a right line so as to form several rows, till the plate be every where moderately covered. After this, with a sort of ball made of cotton, tied up in taffety, beat every part of the plate gently, while the varnish is yet in a fluid state; and to unite it still more, and give it a finer grain, it is proper to take the plate from the fire immediately, and continue striking it on every part with the ball, till it attain a harder consistence in cooling. This must not, nevertheless, be prolonged till the varnish be too cold, for then the ball would be apt to make it rise from the plate.

Le Bosse's hard varnish.

Take of Greek or Burgundy pitch and resin, or colophony of Tyre, or common resin, each two ounces. Melt them together upon a moderate fire, in a new earthen pot, well glazed; and, these ingredients being thoroughly mixt, put to them eight ounces of good nut, or linseed oil, and incorporate the whole well, together, over the fire, for a full half hour. Continue afterwards to boil the mixture till such time as, having taken a little of it out, and suffered to cool, it ropes on touching it with the finger, like a very thick syrup. Take the pot then from the fire, and the varnish being a little cooled, pass it through a new linen cloth, into some vessel that will not soak it up, and can be well corked. Varnish made in this manner, may be kept for twenty years, and will, indeed, be the better for age.

To blacken the varnish.

When the plate is uniformly and thinly covered with the varnish, it must be blackened by a a piece of flambeau, or large wax candle which affords a copious smoke: sometimes 2, or even 4 such candles are used together, for the sake of despatch, that the varnish may not grow cold during the operation. The plate must be heated again, that it may be in a melted state when the operation of blackening is performed; but great care must be taken not to burn it, which may be easily perceived by the varnish smoking and running into little lumps, as if it had contracted some foulness.

It is proper likewise to be very cautious in keeping the flambeau or candle at a due distance from the plate, for fear the wick should touch the varnish, which would both sully and mark it. If it appear that the black has not penetrated the varnish, the plate must be again placed, for a short time, over the chafing-dish; and it will be found, that in proportion as the plate grows hot, the varnish will melt and incorporate with the black, which lay above it, in such a manner that the whole will be equally pervaded by it.

Above all things, the greatest caution should be used in this operation to keep a moderate fire all the time, and to move the plate frequently, and change the place of all the parts of it, that the varnish may be alike melted every where, and be kept from burning. Care must be taken, that during this time, and even till the varnish be entirely cold, no filth, sparks, nor dust, fly on it, for they would then stick fast and spoil the work.

To apply hard varnish to copper-plates.

The plate being perfectly cleansed and freed from greasiness, must be put on a chafing-dish, containing a small fire; and when it is become moderately hot, it must be taken off again, in order to receive the varnish, which must be thus laid on:—Take the proper quantity of the varnish, and putting it on the end of the finger with a stick or other small instrument, touch the plate with it gently, in order that it may be spread in small spots of the same size, at as equal distances as possible over every part; and if the plate cool too much before the whole be finished, heat it again as at first; carefully preserving it, nevertheless, from any dust or foulness that may be liable to fall upon it. When this is done spread the varnish with a little ball, or puff, made of the cotton and taffety, as is done in the case of the soft varnish.

To take soft varnish off the plates when the corrosion is finished.

When the soft varnish is to be taken off, after finishing the corrosion, the plate must first be warmed at the fire, and the border of wax round it removed. Then it must be made hotter till the mixture or composition, as well as the varnish melt, when it must be well wiped with a clean linen cloth, afterwards rubbed heartily in every part with oil of olives: which being performed, it is ready to be re-touched by the graver, if there be occasion.

To remove the hard varnish.

Choose a very soft coal of fallow wood, and, without burning it, strip off the bark, and then dipping it in water, of which some likewise should be poured on the plate; rub the varnish with it, but continually the same way as in polishing the copper, which will take off the varnish. Be particularly careful, nevertheless, to prevent any gravel from falling on the plate; as also to observe that there are no hard grains in the coal, for either of these would make scratches on the plate, which would be very difficult to efface, especially upon the tender parts.

To cleanse copper-plates after the removal of the varnish.

When the varnish is all taken off from the plate, the copper remains of a disagreeable colour, from the effect the fire and water have had upon it; but in order to restore it to its usual appearance, use this method:—Take some of the refiners' *aqua fortis*, and if it be pure, put two-thirds, or more, of water to it. Then take a linen rag dipped in the *aqua fortis* thus lowered with water, and rub with it all the engraved parts of the copper, by which it will be found to become bright and clean, and of the common colour of copper.

Wipe the plate immediately after this with another linen rag that is dry and clean, till not the least of the *aqua fortis* and water remain on it, and pour upon it afterwards a little olive oil, and with a small piece of old hat, or other such thing, rub the oil strongly over every part of it. After this clean the plate with a linen cloth, being cautious not to employ the rag for that purpose which had been used to wipe off the refiner's *aqua fortis*.

To prepare box-wood for engraving.

The wood being chosen, and cut into a proper form and size, it must be planed as even and truly as possible, and will be then ready to receive the drawing or chalking, of the design to be engraved.

Now take white lead and temper it with water by grinding; then spread it first thinly on the surface by a brush pencil, and afterwards rub it well with a fine linen rag, while yet wet, and, when it is dry, brush off any loose or powdery part by a soft pencil.

If the design be sketched on the wood by drawing, it may be done by Indian or common ink (but the first is far preferable,) either by a pen or pencil, or by a black-lead pencil, though that scarcely marks strong enough for finer work.

To free copper plates from grease.

When the plates are designed for etching, being thus finished with the burnisher, they should be well washed with clean water, and then dried by the fire. After which they should be wiped dry with a linen cloth; and to be certain that there may be no kind of grease upon them they should be rubbed over with the crumb of very stale bread. Scraping very soft chalk over it, and rubbing the plate well, are very sure means of preventing either any grease, bread, or other foulness whatever remaining.

To secure copper-plates from corrosion.

Take equal parts of wax and turpentine, and double the quantity of olive oil, with the same quantity of hog's lard. Melt the whole over the fire in an earthen vessel, taking care to mix the ingredients well, and leave them to boil some time, till they be well incorporated.

The advantage of this mixture is, that it may at any time, being warmed, be put with the finger on the places desired to be covered; by which means the further operation of the *aqua fortis* on such places, may be instantly prevented without any other trouble or preparation, or without interrupting or delaying the principal operation.

This mixture may be employed equally well with the hard as with the soft varnish; the intention of using such a composition is, if any scratches or false strokes happen in the etching, they are to be stopped out with a hair pencil dipped in this composition mixed with lamp-black, previously to laying on the aqua fortis, or as it is called, biting in.

To choose copper for engraving.

Plates intended for engraving ought to be of the best copper, which should be very malleable, firm, and with some degree of hardness, free from veins, or specks, or dissimilar parts. The redness of copper is a presumptive mark of its being good, but not an infallible one; for though it is, in general, a proof of the purity of the copper, yet it does not evince that the quantities may not be injured by too frequent infusion.

Copper-plates may be had ready prepared in most large towns: but when these cannot be had, procure a pretty thick sheet of copper, rather larger than the drawing, and let the brazier planish it well; then take a piece of pumice-stone, and with water rub it all one way, till it becomes tolerably smooth and level; a piece of charcoal is next used with water for polishing it still farther, and removing the deep scratches made by the pumice-stone, and it is then finished with a piece of charcoal of a finer grain, with a little oil.

To engrave in mezzotinto.

This art is recommended for the amazing ease with which it is executed, especially by those who have any notion of drawing.

Mezzotinto prints are those which have no hatching or strokes of the graver, but whose lights and shades are blended together, and appear like a drawing of Indian ink.

The tools used in this art, after procuring a well-polished copper plate, are—oil stone, grounding-tools, scrapers, burnishers, and needles.

To lay the ground.

Mark off upon the bottom of the plate the distance intended for the writing, coat of arms, &c. then lay the plate, with a piece of swan-skin flannel under it, upon the table, hold the grounding-tool in the hand perpendicularly; lean upon it moderately hard, continually rocking the hand in a right line from end to end, till the plate is wholly covered in one direction: next cross the strokes from side to side, afterwards from corner to corner, working the tool each time all over the plate, in every direction, almost like the points of a compass; taking all possible care not to let the tool cut (in one direction) twice in a place. This done, the plate will be full, or all rough alike, and would, if it were printed, appear completely black.

Having laid the ground, take the scrapings of black chalk, and with a piece of rag, rub them over the plate; or, with two or three candles, smoke it, as before directed, for etching.

Now take the print or drawing, and having rubbed the back with red chalk-dust, mixed with white lake, proceed to trace it on the plate.

To whet the grounding-tool.

If a tooth of the tool should break, it may be perceived in the working by a streak or gap, which will appear in the ground in a straight line; in which case the tool must be whetted on the back, holding it sloping, and in a circular manner, like the bottom of the tool.

To scrape the picture.

Take a blunt needle, and mark the outlines only; then with a scraper scrape off the lights in every part of the plate, as clean and as smooth as possible, in proportion to the strength of the lights in the picture, taking care not to hurt the outlines: and in order to see better, with the thumb and fore-finger of the left hand, hold a piece of transparent paper, sloping, just over the right hand, and the artist will soon be a judge of the different tints of the work he is doing; scraping off more or less of the ground, as the different strengths of lights and tints require.

The use of the burnisher is to soften and rub down the extreme light parts after the scraper is done with: such as the tip of the nose, forehead, linen, &c. which might otherwise, when proved, appear rather misty than clear.

Another method.

Etch the outlines of the original, as also of the folds in drapery, marking the breadth of the shadows by dots, which having bit of a proper colour with aqua fortis, take off the ground used in etching, and, having laid the mezzotinto ground, proceed to scrape the plate as above.

Four or five days before the plates are ready for proving, notice must be given to the rolling press printer to wet some French paper, or a thick mellow paper in imitation of it, as that time is necessary for it to lie in wet. When the proof is dry, touch it with white chalk where it should be lighter, and with black chalk where it should be darker; and when the print is re-touched, proceed as before for the lights, and for the shades use a small grounding-tool, as much as is necessary to bring it to the proper colour; and when this is done, prove it again, and so proceed to prove and touch till it is entirely finished. When the plate tarnishes, a little vinegar, and salt, kept in a phial, will take it off, wiping it dry with a clean rag.

Avoid as much as possible over-scraping any part before the first proving, as, by this caution, the work will appear the more elegant.

To engrave in aquatinta.

This very much resembles drawing in Indian ink. This process consists in corroding the copper with aqua-fortis, in such a manner, that an impression from it has the appearance of a tint laid on the paper. This is effected by covering the copper with a substance which takes a granulated form, so as to prevent the aqua-fortis from acting where the particles adhere, and by this means cause it to corrode the copper partially, and in interstices only. When these particles are extremely minute, and near to each other, the impression from the plate appears to the naked eye like a wash of Indian ink. But when they are larger, the granulation is more distinct; and as this may be varied at pleasure, it is capable of being adapted to a variety of purposes and subjects.

The matter generally used for this purpose, is composed of equal parts of asphaltum and transparent resin, reduced to powder and sifted on the plate, (which has been previously greased,) through a fine sieve. The plate is then heated so as to make the powder adhere, and the artist scrapes it away when a strong shade is wanted, and covers those parts with varnish where he wishes a very strong light to appear. The aqua-fortis, properly diluted with water, is then put on within a fence of wax, as in common etching for engraving, and by repeated applications, covering the light parts still with varnish, the effect is produced.

To engrave on wood.

The block is commonly made of pear-tree, or box, and differs in thickness according to its size. The surface for the engraving is on the transverse section of the wood; the subject is drawn upon it with a pen and Indian ink, with all the finishing that it is required to have in the impression. The spaces between the lines are cut away with knives, chisels, and gouges, leaving the lines that have been drawn with ink.

The taking impressions from blocks of wood differs from that of copper-plate in this, that in the latter they are delivered from the incision, while in the wooden blocks they are delivered from the raised part.

Chiar' oscuro.

This method of engraving is performed with three blocks. The outline is cut in one, the deep shadows in a second, and the third gives a tint over the whole, except where the lights are cut away. These are substituted in their turn, each print receiving an impression from each block. This mode of engraving was designed to represent the drawing of the old masters.

To etch upon glass.

Procure several thick clear pieces of crown glass, and immerse them in melted wax, so that each may receive a complete coating. When perfectly cold, draw on them, with a fine steel point, flowers, trees, houses, portraits, &c. Whatever parts of the drawing are intended to be corroded with the acid, should be perfectly free from the least particle of wax. When all these drawings are finished, the pieces of glass must be immersed one by one in a square leaden box or receiver, where they are to be submitted to the action of fluoric acid, or fluoric acid gas.

It will be necessary to have some water in the receiver for the absorption of the superabundant gas; and the receiver should have a short leaden pipe attached to it for the reception of the beak of the retort. This should be well luted with wax. At the top of the receiver there is a sliding door for the admission of the plates; this is to be well luted whilst the gas is acting. When the glasses are sufficiently corroded, they are to be taken out; and the wax is to be removed by first dipping them in warm, and then in hot water. Various colours may be applied to the corroded parts of the glass, whereby very fine painting may be executed. In the same manner, sentences and initials of names may be etched on wine-glasses, tumblers, &c.

Another method.

Glass may also be etched, by immersing it in liquid fluoric acid, after having been coated with wax and drawn on, as in the last method. There is this difference, however, in the use of the liquid and the gas, that the former renders the etching *transparent*, whilst that produced by the glass is quite *opaque*.

In this method the potass of the glass is set free, whilst the silex or sand is acted on; consequently no vessel of glass can ever be employed with safety to contain this acid in a liquid state, as it would soon be corroded into holes: It is, therefore, generally preserved in *leaden* bottles, on which it has no power to act.

Simple method of etching glass, as applied to thermometers.

Coat the glass to be graduated, &c. with yellow wax, and trace with a steel point whatever is intended to be etched. Now dip the glass in sulphuric acid, and shake over it some finely pulverized fluate of lime (fluor spar.) This salt will be decomposed by the affinity of lime for sulphuric acid. Accordingly the fluoric acid will be set free to attack the silica of the glass. Corrosion of those parts which are uncovered by the wax, will be the consequence.

To engrave on precious stones.

The first thing to be done in this branch of engraving is to cement two rough diamonds to the ends of two sticks large enough to hold them steady in the hand, and to rub or grind them against each other till they be brought to the form desired. The dust or powder that is rubbed off, serves afterwards to polish them, which is performed by a kind of mill that turns a wheel of soft iron. The diamond is fixed in a brass dish; and, thus applied to the wheel, is covered with diamond dust, mixed up with oil of olives: and when the diamond is to be cut facet-wise, first one face and then another is applied to the wheel. Rubies, sapphires, and topazes, are cut and formed the same way on a copper wheel, and polished with tripoli diluted in water. Agates, amethysts, emeralds, hyacinths, granites, rubies, and others of the softer stones, are cut on a leaden wheel moistened with emery and water, and polished with tripoli on a pewter wheel. Lapis-lazuli, opal, &c. are polished on a wooden wheel.

To fashion and engrave vases of agate, crystal, lapis-lazuli, or the like, a kind of lathe is made use of, similar to that used by pewterers, to hold the vessels, which are to be wrought with proper tools. The engraver's lathe generally holds the tools, which are turned by a wheel; and the vessel cut and engraved, either in relievo or otherwise; the tools being moistened from time to time with diamond dust and oil, or at least emery and water. To engrave figures or devices on any of these stones, when polished, such as medals, seals, &c. a little iron wheel is used, the ends of whose axis are received within two pieces of iron, placed upright, as in the turner's lathe; and to be brought closer, or set further apart, at pleasure; at one end of the axis are fixed the proper tools, being kept tight by a screw. Lastly, the wheel is turned by the foot, and the stone applied by the hand to the tool, then shifted and conducted as occasion requires.

The tools are generally of iron, and sometimes of brass; their form is various. Some have small round heads, like buttons, others like ferrels, to take the pieces out, and others flat, &c. When the stone has been engraved, it is polished on wheels of hair-brushes and tripoli.

To engrave upon steel.

Steel blocks, or plates of sufficient size to to receive the intended engraving, are softened, or decarbonated upon their substances, and thereby rendered a better material for receiving all kinds of work, than even copper itself. After the intended work has been executed upon the bolck, it is hardened with great care by a new process, which prevents injury to the most delicate work. A cylinder of steel, previously softened, is then placed in the transferring press, and repeatedly passed over the engraved blocks, by which the engraving is transferred, *in relief*, to the periphery of the cylinder, the press having a vibrating motion, equalling that of the cylinder upon its axis, by which new surfaces are presented equalling the extent of engraving. This cylinder is then hardened, and is ready for indenting either copper or steel plates, which is done by placing it in the same press before described, and repeatedly pressing it over the copper or steel plates, thereby producing another engraving identically like that upon the orginal block. This may be repeated upon any required number of plates, as the original engraving will remain to produce other cylinders, if ever required, and when transferred to steel plates, and hardened, they will also serve as additional matrices for the production of new cylinders.

DYEING, IN ALL ITS VARIETIES.

To prepare mordants.

Dyeing is a chemical process, and consists in combining a certain colouring matter with fibres of cloth. The facility with which cloth imbibes a dye, depends upon two circumstances; the union of the cloth and the dye-stuff, and the union of the dye-stuff, or dying material, and the fluid in which it is dissolved. Wool unites with almost all colouring matters, silk in the next degree, cotton considerably less, and linen the least of all. To dye cotton or linen, the dye-stuff, or colouring material, should, in many cases, be dissolved in a substance for which it has a weaker connexion than with the solvent employed in the dyeing of wool or silk. Thus we may use the colour called oxide of iron, dissolved in sulphuric acid, to dye wool; but to dye cotton and linen, it is necessary to dissolve it in acetous acid. Were it possible to procure a sufficient number of colouring substances, having a strong affinity for cloths, to answer all the purposes of dyeing, that art would be exceedingly simple and easy. But this is by no means the case. This difficulty has, however, been obviated by a very ingenious contrivance. Some other substance is employed which strongly unites with the cloth and the colouring matter. This substance, therefore, is previously combined with the cloth, which is then dipped into a solution containing the colour. The colour then combines with the intermediate substance, which being firmly combined with the cloth, secures the permanence of the dye. Substances employed for this purpose are denominated *mordants*.

To choose and apply them.

The most important part of dyeing is, therefore, the choice and application of *mordants;* as upon them, the permanency of almost every dye depends. Mordants must be previously dissolved in some liquid, which has a weaker union with the mordants than the cloth has; and the cloth must then be steeped in this solution, so as to saturate itself with the mordant. The most important, and most generally used mordant is *alumine*. It is used either in a state of *common alum*, in which it is combined with sulphuric acid, or in that state called acetate of alumine.

Use of alum as a mordant.

Alum, to make a mordant, is dissolved in water, and very frequently, a quantity of tartrate of potass is dissolved with it. Into this solution WOOLLEN cloth is put, and kept in it till it has absorbed as much alumine as is necessary. It is then taken out, and for the most part washed and dried. It is now a good deal heavier than it was before, owing to the alum which has combined with it.

Acetite of alumine,

Is prepared as a mordant by pouring acetite of lead into a solution of alum. This mordant is employed for COTTON and LINEN. It answers for these much better than alum; the stuff is more easily saturated with alumine, and takes in consequence, a richer and more permanent colour.

White oxide of tin.

This mordant has enabled the moderns greatly to surpass many of the ancients, in the fineness of their colours; and even to equal the famous Tyrian purple; and by means of it scarlet, the brightest of all colours, is produced. It is the white oxide of tin, alone, which is the *real* mordant.

Tin is used as a mordant in three states; dissolved in nitro-muriatic acid, in acetous acid, and in a mixture of sulphuric and muriatic acids: but *nitro-muriate of tin is the common mordant employed by dyers.* They prepare it, by dissolving tin in diluted nitric acid, to which a certain proportion of common salt, or sal ammoniac is added.

When the nitro-muriate of tin is to be used as a mordant, it is dissolved in a large quantity of water, and the cloth is dipped in the solution, and allowed to remain till sufficiently saturated. It is then taken out, washed and dried. Tartar is usually dissolved in the water along with the nitro-muriate.

Red oxide of iron.

This is also used as a mordant in dyeing; it has a very strong affinity for all kinds of cloth, of which the permanency of red iron-spots, or iron-moulds on linen and cotton is a sufficient proof. As a mordant it is used in two states: in that of sulphate of iron, or copperas, and that of acetite of iron. The first, or copperas, is commonly used for *wool*. The copperas is dissolved in water, and the cloth dipped into it. It may be used also for *cotton*, but in most cases acetite of iron is preferred, which is prepared by dissolving iron, or its oxide, in vinegar, sour beer, or pyroligneous acid, and the longer it is kept the better.

Tan, &c.

Tan is very frequently employed as a mordant. An infusion of nut-galls, or of sumach, or of any other substance containing tan, is made in water, and the cloth is dipped in this infusion, and allowed to remain till it has absorbed a sufficient quantity. Tan is often employed also, along with other mordants, to produce a compound mordant. Oil is also used for the same purpose, in dyeing cotton and linen. The mordants with which tan is most frequently combined, are alumine, and oxide of iron.

Besides these mordants, there are several other substances frequently used as auxiliaries, either to facilitate the combination of the mordant with the cloth or to alter the shade of colour; the chief of these are, tartar, acetate of lead, common salt, sal ammoniac, sulphate of copper, &c.

Mordants not only render the dye permanent, but have also considerable influence on the colour produced. The same colouring matter produces very different dyes, according as the mordant is changed. Suppose, for instance, that the colouring matter is cochineal; if we use the aluminous mordant, the cloth will acquire a crimson colour; but the oxide of iron produces with it, a black.

In dyeing, then, it is not only necessary to procure a mordant which has a sufficiently strong affinity for the colouring matter and the cloth, and a colouring matter which possesses the wished-for colour in perfection; but we must procure a mordant and a colouring matter of such a nature, that when combined together, they shall possess the wished-for colour in perfection; and even a great variety of colours may be produced with a single dye-stuff, provided we change the mordant sufficiently.

To determine the effects of various salts or mordants on colours.

The dye of madder.

For a madder red on woollens, the best quantity of madder is one half of the weight of the woollens that are to be dyed; the best proportion of salts to be used is five parts of alum and one of red tartar for sixteen parts of the stuff.

A variation in the proportion of the salts, wholly alters the colour that the madder naturally gives. If the alum is lessened, and the tartar increased, the dye proves a red cinnamon. If the alum be entirely omitted, the red wholly disappears, and a durable tawny cinnamon is produced.

If woollens are boiled in weak pearl-ash and water, the greater part of the colour is destroyed. A solution of soap discharges part of the colour, and leaves the remaining more beautiful.

Volatile alkalies heighten the red colour of the madder, but they make the dye fugitive.

The dye of logwood.

Volatile alkaline salts or acids incline this to purple; the vegetable and nitrous acids render it pale; the vitriolic and marine acids deepen it.

Lime water.

In dyeing browns or blacks, especially browns, lime water is found to be a good corrective, as also an alterative, when the goods are not come to the shade required; but practice alone can show its utility; it answers for either woollens, silks, or cottons.

To render colours holding.

Browns and blues, or shades from them, require no preparation; but reds and yellows, either of silk, cotton, or woollen, require a preparation to make them receive the dye, and hold it fast when it has received it. Alum and tartar, boiled together, when cold, form a mastic, within the pores of the substance, that serves to retain the dye, and reflect the colour in a manner transparently.

Almost all browns are deemed fast and holding colours, without any preparation: the dyeing materials containing in themselves a sufficient degree of astringent quality to retain their own colours. Many reds are also equally holding, but none more so than those made with madder on woollens prepared with alum and tartar.

A very fast red is also made with Brazil wood, by boiling the woollen in alum and tartar, and suffering the cloth to remain several days in a bag kept moist by the preparation liquor. The cause of the solidity of the colour from Brazil wood dyed after this method, arises from the alum and tartar masticating itself within the pores of the wool in quite a solid state.

There is not a drug used in the whole art of dyeing, but may be made a permanent dye, by finding out a salt, or solution of some metal, that, when once dissolved by acids, or by boiling water, will neither be affected by the air, nor be dissolved by moisture. Such are alum and tartar, the solution of tin, &c. But these salts and solutions do not answer with all ingredients that are used in dyeing.

To purchase dyeing materials.

The names of the principal dyeing materials are alum, argol, or tartar, green copperas, verdigris, blue vitriol, roche alum, American or quercitron, and oak bark, fenugreek, logwood, old and young fustic, Brazil wood, braziletto, camwood, barwood, and other red woods, peach wood, sumach, galls, weld, madder of 3 or 4 sorts, safflower, savory, green wood, annatto, turmeric, archil, cudbear, cochineal, lac cake, lac dye, and indigo. The whole may be purchased of druggists and colourmen.

To dye wool and woollen cloths of a blue colour.

Dissolve one part of indigo in four parts of concentrated sulphuric acid; to the solution, add one part of dry carbonate of potass, and then dilute it with eight times its weight of water. The cloth must be boiled for an hour in a solution, containing 5 parts of alum, and 3 of tartar, for every 32 parts of cloth. It is then to be thrown into a *water-bath* previously prepared, containing a greater or smaller proportion of diluted sulphate of indigo, according to the shade which the cloth is intended to receive. In this bath it must be boiled till it has acquired the wished-for colour.

The only colouring matters employed in dyeing blue, are woad and indigo.

Indigo has a very strong affinity for wool, silk, cotton, and linen. Every kind of cloth, therefore, may be dyed with it, without the assistance of any mordant whatever. The colour thus induced is very permanent. But indigo can only be applied to cloth in a state of solution; and the only solvent known is sulphuric acid. The sulphate of indigo is often used to dye wool and silk blue, and is known by the name of Saxon blue.

It is not the only solution of that pigment employed in dyeing. By far the most common method is, to deprive indigo of its blue colour, and reduce it to green, and then to dissolve it in water by means of alkalies. Two different methods are employed for this purpose. The first is, to mix with indigo a solution of green oxide of iron, and different metallic sulphurets. If, therefore, indigo, lime, and green sulphate of iron, are mixed together in water, the indigo gradually loses its blue colour, becomes green, and is dissolved. The *second* method is, to mix the indigo, in water, with certain vegetable substances which readily undergo fermentation; the indigo is dissolved by means of quick lime or alkali, which is added to the solution.

The *first* of these methods is usually followed in dyeing *cotton* and *linen;* the *second,* in dyeing *wool* and *silk.*

In the dyeing of wool, woad and bran are commonly employed as vegetable ferments, and lime as the solvent of the green base of the indigo. Woad itself contains a colouring matter precisely similar to indigo; and by following the common process, indigo may be extracted from it. In the usual state of woad, when purchased by the dyer, the indigo, which it contains, is probably not far from the state of green pollen. Its quantity in woad is but small, and it is mixed with a great proportion of other vegetable matter.

When the cloth is first taken out of the vat, it is of a green colour; but it soon becomes blue. It ought to be carefully washed, to carry off the uncombined particles. This solution of indigo is liable to two inconveniences: first, it is apt sometimes to run too fast into the putrid fermentation; this may be known by the putrid vapours which it exhales, and by the disappearing of the green colour. In this state it would soon destroy the indigo altogether. The inconvenience is remedied by adding more lime, which has the property of moderating the putrescent tendency. Secondly, sometimes the fermentation goes on too languidly. This defect is remedied by adding more bran, or woad, in order to diminish the proportion of thick lime.

To make chemic blue and green.

Chemic for light blues and greens, on silk, cotton, or woollen, and for cleaning and whitening cottons, is made by the following process:—

Take 1 lb. of the best oil of vitriol, which pour upon 1 ounce of the best Spanish flora indigo, well pounded and sifted: add to this, after, it has been well stirred, a small lump of common pearl-ash as big as a pea, or from that to the size of 2 peas, this will immediately raise a great fermentation, and cause the indigo to dissolve in minuter and finer particles than otherwise. As soon as this fermentation ceases, put it into a bottle tightly corked, and it may be used the next day. Observe, if more than the quantity prescribed of pearl-ash should be used, it will deaden and sully the colour.

Chemic for green, as above for blue, is made by only adding one-fourth more of the oil of vitriol.

If the chemic is to be used for woollen, East India indigo will answer the purpose even better than Spanish indigo, and at one quarter of the price; but the oil of vitriol is good for both.

To make a solution of tin in aqua regia.

Mix together 8 ounces of filtered river water, and 8 ounces of double aqua fortis; add gradually half an ounce of sal-ammoniac dissolved piece by piece, and 2 drachms of saltpetre. Then take 1 ounce of refined block tin: put it into an iron pan, and set it over the fire; when melted, hold it 4 or 5 feet over the vessel, and drop it into water, so as to let it fall in pieces.

Next put a small piece of this granulated tin into the above aqua-regia, and when the last piece disappears, add more gradually till the whole is mixed; mind and keep it firmly corked. When finished it will produce a most excellent yellow, though should it fail in that respect, it will not be the worse for use; keep it cool, as heat will injure and even spoil it.

To make muriate of tin.

Take 8 ounces of muriatic acid, and dissolve in it, by slow degrees, half an ounce of granulated tin; when this is done pour off the clear liquid into a bottle and weaken it, if required, with pure filtered river water.

To determine the effect of various waters on different colours.

Snow water contains a little muriate of lime, and some slight traces of nitrate of lime; rain water has the same salts in a larger quantity, and also carbonic acid; spring water most frequently contains carbonate of lime, muriate of lime, muriate of soda, or carbonate of soda. River water has the same substances but in less abundance. Well water contains sulphate of lime or nitrate of pot-ash besides the above-named salts. Should the water contain a salt, or a mineral acid, in the first instance, an acid will be requisite to neutralize it, and in the second, an alkali. Thus waters of any quality may be saturated by their opposites, and rendered neutral.

To discharge colours.

The dyers generally put all coloured silks which are to be discharged, into a copper in which half a pound or a pound of white soap has been dissolved. They are then boiled off, and when the copper begins to be too full of colour, the silks are taken out and rinsed in warm water. In the interim a fresh solution of soap is to be added to the copper, and then proceed as before till all the colour is discharged. For those colours that are wanted to be effectually discharged, such as greys, cinnamons, &c. when soap does not do, tartar must be used. For slate colours, greenish drabs, olive drabs, &c. oil of vitriol in warm water must be used; if other colours, roche alum must be boiled in the copper, then cooled down and the silks entered and boiled off, recollecting to rinse them before they are again dyed. A small quantity of muriatic acid, diluted in warm water, must be used to discharge some fast colours; the goods must be afterwards well rinsed in warm and cold water to prevent any injury to the stalk.

To discharge cinnamons, greys, &c. when dyed too full.

Take some tartar, pounded in a mortar, sift it into a bucket, then pour over in some boiling water. The silks, &c. may then be run through the clearest of this liquor, which will discharge the colour; but if the dye does not take on again evenly, more tartar may be added, and the goods run through as before.

To re-dye or change the colours of garments, &c.

The change of colour depends upon the ingredients with which the garments have been dyed. Sometimes when these have been well cleaned, more dyeing stuff must be added, which will afford the colour intended; and sometimes the colour already on the cloth must be discharged and the articles re-dyed.

Every colour in nature will dye black, whether blue, yellow, red or brown, and black will always dye black again. All colours will take the same colour again which they already possess; and blues can be made green or black; green may be made brown, and brown green, and every colour on re-dyeing will take a darker tint than that at first.

Yellows, browns, and blues, are not easily discharged; maroons, reds, of some kinds, olives, &c. may be discharged.

For maroons, a small quantity of roche alum may be boiled in a copper, and when it is dissolved, put in the goods, keep them boiling, and probably, in a few minutes, enough of it will be discharged to take the colour intended.

Olives, greys, &c. are discharged by putting in two or three table spoonsful, more or less, of oil of vitriol: then put in the garments, &c. and boil, and it will become white. If chemic green, either alum, pearl-ash, or soap, will discharge it off to the yellow; this yellow may mostly be boiled off with soap, if it has received a preparation for taking the chemic blue. Muriatic acid used at a hand heat will discharge most colours. A black may be dyed a maroon, claret, green, or a dark brown; and it often happens that black is dyed claret, green, or dark brown; but green is the principal colour into which black is changed.

To alum silks.

Silks should be alumed cold, for when it is alumed hot, it is deprived of a great part of its lustre. The alum liquor should always be strong for silks, as they take the dye more readily afterwards.

To dye silk blue.

Silk is dyed light blue by a ferment of six parts of bran, six of indigo, six of potass, and one of madder. To dye it of a dark blue, it must previously receive what is called a *ground-colour;* a red dye-stuff, called archil, is used for this purpose.

To dye cotton and linen blue.

Cotton and linen are dyed blue by a solution of one part of indigo, one part of green sulphate of iron, and two parts of quick-lime.

Yellow dyes.

The principal colouring matters for dyeing yellow, are weld, fustic, and quercitron bark. Yellow colouring matters have too weak an affinity for cloth, to produce permanent colours without the use of *mordants.* Cloth, therefore, before it is dyed yellow, is always prepared by soaking it in alumine. Oxide of tin is sometimes used when very fine yellows are wanting. Tan is often employed as subsidiary to alumine, and in order to fix it more copiously on cotton and linen. Tartar is also used as an auxiliary, to brighten the colour; and muriate of soda, sulphate of lime, and even the sulphate of iron, to render the shade deeper. The yellow dye by means of fustic is more permanent, but not so beautiful as that given by weld, or quercitron. As it is permanent, and not much injured by acids, it is often used in dyeing compound colours, where a yellow is required. The mordant is alumine. When the mordant is oxide of iron, fustic dyes a good permanent drab colour. Weld, and quercitron bark yield nearly the same kind of colour; but the bark yields colouring matter in greater abundance and is cheaper than weld. The method of using each of these dye-stuffs is nearly the same.

To dye woollens yellow.

Wool may be dyed yellow by the following process; let it be boiled for an hour, or more, with above one-sixth of its weight of alum, dissolved in a sufficient quantity of water as a mordant. It is then to be plunged, without being rinsed, into a bath of warm water, containing as much quercitron bark as equals the weight of the alum employed as a mordant. The cloth is to be turned through the boiling liquid, till it has acquired the intended colour. Then, a quantity of clean powdered chalk, equal to the hundredth part of the weight of the cloth, is to be stirred in, and the operation of dyeing continued for eight or ten minutes longer. By this method a pretty deep and lively yellow may be given.

For very bright orange, or golden yellow, it is necessary to use the oxide of tin as a mordant. For producing bright golden yellows, some alum must be added along with the tin. To give the yellow a delicate green shade, tartar must be added in different proportions, according to the shade.

To dye silks yellow.

Silk may be dyed of different shades of yellow, either by weld or quercitron bark, but the last is the cheapest of the two. The proportion should be from one to two parts of bark, to 12 parts of silk, according to the shade. The bark, tied up in a bag, should be put into the dyeing vessel, whilst the water which it contains is cold; and when it has acquired the heat of about 100 degrees, the silk, having been previously alumed, should be dipped in, and continued, till it assumes the wished-for colour. When the shade is required to be deep, a little chalk, or pearl-ash should be added towards the end of the operation.

To dye linens and cottons yellow.

The mordant should be acetate of alumine, prepared by dissolving one part of acetate of lead, and three parts of alum, in a sufficient quantity water. This solution should be heated to the temperature of 100 degrees: the cloth should be soaked in it for two hours, then wrung out and dried. The soaking may be repeated, and the cloth again dried as before. It is then to be barely wetted with lime-water, and afterwards dried. The soaking in the acetate of alumine may be again repeated; and if the shade of yellow is required to be very bright and durable, the alternate wetting with lime-water and soaking in the mordant may be repeated three or four times.

The *dyeing-bath* is prepared by putting 12 or 18 parts of quercitron bark (according to the depth of the shade required,) tied up in a bag, into a sufficient quantity of cold water. Into this bath the cloth is to be put, and turned in it for an hour, while its temperature is gradually raised to about 120 degrees. It is then to be brought to a boiling heat, and the cloth allowed to remain in it only for a few minutes. If it is kept long at a boiling heat, the yellow acquires a shade of brown.

To fix a fine mineral yellow upon wool, silk, cotton, hemp, &c.

Mix one pound of sulphur, two pounds of white oxide of arsenic, and five parts of pearl-ash; and melt the whole in a crucible, at a heat a little short of redness. The result is a yellow mass, which is to be dissolved in hot water; and the liquor filtrated, to separate it from a sediment formed chiefly of metallic arsenic, in shining plates, and in a small part, of a chocolate-coloured matter, which appears to be a sub-sulphuret of arsenic. Dilute the filtrated liquor, then add weak sulphuric acid, which produces a flocculent precipitate, of a most brilliant yellow colour. This precipitate washed upon a cloth filter, dissolves with the utmost ease in liquid ammonia, giving a yellow solution, which colour is to be removed by an excess of the same alkali.

To prepare realgar.

The most brilliant and permanent yellow that can be imagined, is the *sulphuret of arsenic, or realgar*, into which, more or less diluted, according to the depth of tint required, the wool, silk, cotton, or linen, is to be dipped. All metallic utensils must be carefully avoided. When the stuffs come out of this bath they are colourless, but they insensibly take on a yellow hue as the ammonia evaporates. They are to be exposed as equally as possible to a current of open air; and when the colour is well come out, and no longer heightens, they are to be washed and dried.

Wool should be fulled in the ammoniacal solution, and should remain in it till it is thoroughly soaked; then, very slightly and uniformly pressed, or else merely set to drain of itself. Silk, cotton, hemp, and flax, are only to be dipped in the dyeing liquid, which they easily take. They must then be well pressed.

The sulphuret of arsenic will give every imaginable tint to stuffs, from the deep golden yellow to the lightest straw-colour, which has the invariable advantage of never fading, of lasting even longer than the stuffs themselves, and of resisting all re-agents, except alkalies. Hence it is peculiarly fitted for costly tapestry, velvets, and other articles of furniture which are not in danger of being washed with alkalies or soap, and to which the durability of colour is a most important object. It may also be used with advantage in paper-staining.

Red dyes.

The colouring matters employed for dying red, are archil, madder, carthamus, kermes, cochineal, and Brazil-wood.

To dye woollens red, crimson, and scarlet.

Coarse woollen stuffs are dyed red with madder or archil: but fine cloth is almost exclusively dyed with cochineal, though the colour which it receives from kermes, is much more durable. Brazil-wood is scarcely used, except as an auxiliary, because the colour which it imparts to wool, is not permanent.

Wool is dyed crimson, by first impregnating it with alumine, by means of an alum bath, and then boiling it in a decoction of cochineal, till it has acquired the wished-colour. The crimson will be finer, if the tin-mordant is substituted for alum; indeed, it is usual with dyers, to add a little nitro-muriate of tin, when they want fine crimsons. The addition of archil and potass to the cochineal, both renders the crimson darker, and gives it more bloom; but the bloom very soon vanishes. For paler crimsons, one-half of the cochineal is withdrawn, and madder substituted in its place.

Wool may be dyed scarlet, by first boiling it in a solution of murio-sulphate of tin, then dyeing it pale yellow with quercitron bark, and afterwards crimson with cochineal; for scarlet is a compound colour, consisting of crimson mixed with a little yellow.

To carry the colour into the body of the cloth.

Make the moistened cloth pass through between rollers placed within and at the bottom of the dye-vat; so that the web, passing from one windlass through the dye-vat, and being strongly compressed by the rollers in its passage to another windlass, all the remaining water is driven out, and is re-placed by the colouring liquid, so as to receive colour into its very centre. The winding should be continued backwards and forwards from one windlass to the other, and through the rolling-press, till the dye is of sufficient intensity.

To dye silks red, crimson, &c.

Silk is usually dyed red with cochineal, or carthamus, and sometimes with Brazil-wood. Kermes does not answer for silk; madder is scarcely ever used for that purpose, because it does not yield a colour bright enough. Archil is employed to give silk a bloom; but it is scarcely ever used by itself, unless when the colour wanted is lilac.

Silk may be dyed crimson, by steeping it in a solution of alum, and then dyeing in the usual way in a cochineal bath.

The colours known by the names of *poppy, cherry, rose*, and *flesh colour*, are given to silk by means of carthamus. The process consists merely in keeping the silk as long as it extracts any colour, in an alkaline solution of carthamus, into which as much lemon-juice, as gives it a fine cherry-red colour, has been poured.

Silk cannot be dyed a full scarlet; but a colour approaching to scarlet may be given to it, by first impregnating the stuff with murio-sulphate of tin, and afterwards dyeing it in a bath, composed of four parts of cochineal, and four parts of quercitron bark. To give the colour more body, both the mordant and the dye may be repeated.

A colour, approaching to scarlet may be given to silk, by first dying it in crimson, then dyeing it with carthamus; and lastly, yellow, without heat.

To dye linens and cottons red, scarlet, &c.

Cotton and linen are dyed red with madder. The process was borrowed from the east; hence, the colour is often called Adrianople, or Turkey-red. The cloth is first impregnated with oil, then with galls, and lastly with alum. It is then boiled for an hour in a decoction of madder, which is commonly mixed with a quantity of blood. After the cloth is dyed, it is plunged into a soda ley, in order to brighten the colour. The red given by this process, is very permanent; and when properly conducted, it is exceedingly beautiful. The whole difficulty consists in the application of the mordant, which is by far the most complicated employed in the whole art of dyeing.

Cotton may be dyed scarlet, by means of murio-sulphate of tin, cochineal, and quercitron bark, used as for silk, but the colour is too fading to be of any value.

Black dyes.

The substances employed to give a black colour to cloth, are red oxide of iron, and tan. These two substances have a strong affinity for each other, and when combined, assume a deep black colour, not liable to be destroyed by the action of air or light.

Logwood is usually employed as an auxiliary, because it communicates lustre, and adds considerably to the fulness of the black. It is the wood of a tree which is a native of several of the West-India islands, and of that part of Mexico which surrounds the bay of Honduras. It yields its colouring matter to water. The decoction is at first a fine red, bordering on violet: but if left to itself, it gradually assumes a black colour. Acids give it a deep red colour; alkalies, a deep violet, inclining to brown: sulphate of iron renders it as black as ink, and occasions a precipitate of the same colour.

Cloth, before it receives a black colour, *is usually dyed blue;* this renders the colour much fuller and finer than it would otherwise be. If the cloth is coarse, the blue dye may be too expensive; in that case, a brown colour is given, by means of walnut-peels.

To dye woollens black.

Wool is dyed black by the following process. It is boiled for two hours in a decoction of nut-galls, and afterwards kept, for two hours more, in a bath, composed of logwood and sulphate of iron; kept, during the whole time, at a scalding heat, but not boiling. During the operation, it must be frequently exposed to the air; because the green oxide of iron, of which the sulphate is composed must be converted into red oxide by absorbing oxygen, before the cloth can acquire a proper colour. The common proportions, are five parts of galls, five of sulphate of iron, and thirty of logwood, for every hundred of cloth. A little acetate of copper is commonly added to the sulphate of iron, because it is thought to improve the colour.

To dye silks black.

Silk is dyed nearly in the same manner. It is capable of combining with a great deal of tan; the quantity given is varied at the pleasure of the artist, by allowing the silk to remain a longer or shorter time in the decoction.

To dye cottons and linens black.

The cloth, *previously dyed blue*, is steeped for 24 hours in a decoction of nut-galls. A bath is prepared containing acetate of iron, formed by saturating acetous acid with brown oxide of iron: into this bath the cloth is put in small quantities at a time, wrought with the hand for a quarter of an hour; then wrung out, and aired again; wrought in a fresh quantity of the bath, and afterwards aired. These alternate processes are repeated till the colour wanted is given: a decoction of alder bark is usually mixed with the liquor containing the nut-galls.

To dye wool, &c. brown.

Brown, or fawn colour, though in fact, a compound, is usually ranked among the simple colours, because it is applied to cloth by a single process. Various substances are used for brown dyes.

Walnut-peels, or the green covering of the walnut, when first separated, are white internally, but soon assume a brown, or even a black colour, on exposure to the air. They readily yield their colouring matter to water. They are usually kept in large casks, covered with water, for above a year before they are used. To dye wool brown with them, nothing more is necessary, than to steep the cloth in a decoction of them till it has acquired the wished-for colour. The depth of the shade is proportioned to the strength of the decoction.

The root of the walnut-tree contains the same colouring matter, but in smaller quantity. The bark of the birch also, and many other trees, may be used for the same purpose.

To dye compound colours.

Compound colours are produced by mixing together two simple ones; or which is the same thing by dying cloth first of the simple colour, and then by another. These colours vary to infinity, according to the proportions of the ingredients employed. From blue, red, and yellow, *red olives* and *greenish greys* are made.

From blue, red, and brown, *olives* are made from the lighest to the darkest shades; and by giving a greater shade of red, the *slated* and *lavender greys* are made.

From blue, red, and black, *greys* of all shades are made, such as *sage, pigeon, slate, and lead greys.* The king's or prince's colour is duller than usual; this mixture produces a variety of hues, or colours almost to infinity.

From yellow, blue, and brown, are made the *goose dung* and *olives* of all kinds.

From brown, blue, and black, are produced *brown olives*, and their shades.

From the red, yellow, and brown, are derived the *orange*, *gold colour*, *feuillemort*, or faded leaf, *dead carnations*, *cinnamon*, *fawn*, and *tobacco*, by using two or three of the colours as required.

From yellow, red, and black, *browns* of every shade are made.

From blue and yellow, *greens* of all shades.

From red and blue, *purples* of all kinds are formed.

To dye different shades of green.

Green is distinguished by dyers into a variety of shades, according to the depth, or the prevalence of either of the component parts. Thus, we have sea-green, grass-green, pea-green, &c.

Wool, silk, and linen, are usually dyed green, by giving them first a blue colour, and afterwards dyeing them yellow; when the *yellow* is first given, several inconveniences follow: the yellow partly separates again in the blue vat, and communicates a green colour to it; thus rendering it useless for every other purpose, except dyeing green. Any of the usual processes for dyeing blue and yellow, may be followed, taking care to proportion the depth of the shades to that of the green required.

When sulphate of indigo is employed, it is usual to mix all the ingredients together, and to dye the cloth at once; this produces what is known by the name of Saxon, or English green.

To dye violet, purple, and lilac.

Wool is generally first dyed blue, and afterwards scarlet, in the usual manner. By means of cochineal mixed with sulphate of indigo, the process may be performed at once. Silk is first dyed crimson, by means of cochineal, and then dipped into the indigo vat. Cotton and linen are first dyed blue, and then dipped in a decoction of logwood; but a more permanent colour is given by means of oxide of iron.

To dye olive, orange, and cinnamon.

When blue is combined with red and yellow on cloth, the resulting colour is olive. Wool may be dyed orange, by first dyeing it scarlet, and then yellow. When it is dyed first with madder, the result is a cinnamon colour.

Silk is dyed orange by means of carthamus: a cinnamon colour by logwood, Brazil-wood, and fustic, mixed together.

Cotton and linen receive a cinnamon colour by means of weld and madder; and an olive-colour by being passed through a blue, yellow, and then a madder bath.

To dye grey, drab, and dark brown.

If cloth is previously combined with brown oxide of iron, and afterwards dyed yellow with quercitron bark, the result will be a drab of different shades, according to the proportion of mordant employed. When the proportion is small, the colour inclines to olive, or yellow; on the contrary, the drab may be deepened, or *saddened*, as the dyers term it, by mixing a little sumach with the bark.

To dye a black upon cotton, linen; and mixed goods.

Take tar, iron liquor of the very best quality; add to each gallon thereof, three quarters of a pound of fine flour, and boil it to the consistency of a thin paste. Put the liquor or paste above-mentioned into a tub belonging to a machine used in the process. The goods intended to be dyed are wound upon a roller, and passed through the liquor or paste, betwixt the two rollers; thereby completely staining or dyeing the whole mass or body of the cloth. Pass them into a very hot stove or drying-house till dry, then take cow's dung, put it into a large copper of water about scalding hot, and mix it well together, through which pass the piece of cloth until it be thoroughly softened. Wash the goods, so dunged, extremely well in water. Take a quantity of madder, or logwood, or sumach, or all of them mixed together, as the strength of the cloth and nature of the colour may require, and put them into a copper, or tub of hot water; then enter the goods before mentioned in this liquor, and keep rinsing or moving them therein, until they are brought up to the strength of colour required. Have the goods again well washed and dried. For dyeing black, it will be proper to pass the goods a second time through the above operations; adding more or less of the dyeing-woods as before. If, after the above operations the shade of colour is too full, or too much upon the red hue, it will be necessary to give them a little sumach, and then run them through a liquor made from iron and owler, or alder bark.

Another method.

Take common iron liquor, and add three quarters of fine flour, and by boiling bring it to the consistency of a thin paste; or instead of flour, add glue or linseed, or gum, or all of them mixed together, till it is brought to a proper thickness. Then pass the goods through the machine, and follow the before mentioned operations.

To dye olives, bottle greens, purples, browns, cinnamons, or snuffs.

Take common iron liquor, or common iron liquor with alum dissolved therein, in quantity of each according to the shade of colour wanted, made into a paste or liquid, by adding flour, gum, glue, linseed, or one or more of them as before. Then put the liquor or paste above-mentioned into a tub belonging to the machine, and pass the goods so intended to be dyed, through the machine. Take them from the machine, and hang them up in a very cool room, where they are to remain till thoroughly dry. Take cow's-dung, put it into a large copper of hot water, and mix it well together; through which pass the cloth or goods until thoroughly softened, the quantity of dung and time required, being proportioned as before.

The goods after this process being well washed, take a quantity of liquor made from madder, logwood, sumach, fustic, Brazil, wood, quercitron bark, peach wood, or other woods, to produce the colour wanted, or more of them; and if necessary dilute this liquor with water, according to the shade or fulness of colour wanted to be dyed. Then work the goods through this liquor: after which pass them through cold or warm water, according to colour, the proper application of which is well known to dyers, adding a little alum, copperas, or Roman vitriol, or two or more of them first dissolved in water. Then wash them off in warm water, and dry them. But if the colour is not sufficiently full, repeat the same operations till it is brought to the shade required.

To dye crimson, red, orange, or yellow.

Take red liquor, such as is generally made from alum, and dilute it with water according to the strength or shade of colour wanted to dye, bringing it to the consistency of a paste or liquid, as before described. Then pass the cloth through the machine; which being dried in a cool room, pass it through the operations of dunging and washing as before. Take a quantity of liquor, made from cochineal, madder, peach-wood, Brazil, logwood, woad, fustic, sumach, or any two or more of them proportioned in strength to the shade or colour wanted to dye, and work the goods through this liquor till they are brought to the shade of colour required; after which wash them in cold or warm water, and dry them.

To dye cotton, wool, and silk, with Prussian blue.

Immerse the cotton into a large tub of water slightly acidulated and charged with prussiate of potass. These sorts of stuffs dyed in Prussian blue, and then in olive transformed into green, are particularly sought after in trade. By processes analagous to those employed for cotton stuffs, the inventor has obtained the same shades and colours, on samples of silk; and for many years, he has even succeeded in fixing Prussian blue on wool, and in producing on cloth the same shades as on cotton and silk.

To precipitate acetates of lead and copper, on wool, silk, and cotton.

Soak the stuff which is required to be dyed, in a solution of acetate, or rather, sub-acetate of lead, wring it when it comes out of the bath, drying it in the shade, afterwards wash it, and again immerse it in water charged with sulphurated hydrogen gas. By this process are obtained, in a few minutes, rich and well-laid shades, which vary from the clear *vigone* colour, to the deep brown, according to the force of the mordant and the number of the immersions of the stuffs in the two bathing vessels. From the order of affinities, it is the wool which takes colour the best, afterwards the silk, then the cotton, and lastly the thread, which appears little apt to combine with the mordant.

The different colours above indicated, resist the air well, likewise feeble acids, alkalies, and boiling soap, which modify their shades in an imperceptible manner, and these shades are so striking, that it will appear difficult to obtain them in any other manner.

This new kind of dye is very economical. The sulphurated hydrogen gas is obtained from a mixture of two parts of iron filings, and one of brimstone melted in a pot; this brimstone is bruised, introduced into a matrass, and the gas is removed by sulphuric acid extended in water to a mild heat. The gas absorbs abundantly in cold water.

To dye cotton cloth black.

Take a quantity of Molacca nuts, which, in Bengal, are sold for 2*s*. per cwt., and boil them in water, in close earthen vessels, with the leaves of the tree. During the boiling, a whitish substance formed from the mucilage and oil of the nuts, will rise to the surface; this must be taken off and preserved. The cloth intended to be black, must be printed with this scum, and then dyed, after which let it be passed through lime water, when the printed figures will be changed to a full and permanent black.

To dye wool a permanent blue colour.

Take 4 ounces of the best indigo, reduce it to a very fine powder, and add 12 pounds of wool, in the grease; put the whole into a copper large enough to contain all the wool to be dyed. As soon as the requisite colour is obtained, let the wool be well washed and dried. The liquor remaining may be again used, to produce lighter blues. The colour will be as beautiful and permanent as the finest blue, produced by woad, and the wool by this method, will lose less in weight than if it had been previously scoured.

To produce the Swiss deep and pale red tropical mordants.

When the cotton cloth has been freed by steeping and boiling in soap and water, from the paste used by the weaver, and any other impurities it may have acquired, immerse it thoroughly, or, as it is called, tramp or pad it in a solution of any alkali, and oil or grease, forming an imperfect soap, or boil it in any of the perfect soaps dissolved in water, or in a solution of soda and gallipoli oil, in the proportion of 1 gallon of oil to 20 gallons of soda lees, at the strength of 4 degrees and a half; then dry the cloth in the stove, and repeat the process several times, which may be varied at pleasure, according to the lustre and durability of the colour wanted, stove-drying the cloth between every immersion. To the above solutions add a little sheep's-dung, for the first three immersions; these are called the dung liquors; after the cloth has received the dung liquors, it is steeped for 12 hours in a quantity of water, 110 degrees of Fahrenheit; this is called the green steep. The cloth being again stove-dried, is immersed as above in a solution of alkali and oil, or grease, or boiled in perfect soap dissolved, but without the sheep's dung; or oftener, according to the brilliancy of colours wanted, stove-drying as before, between every immersion; these are called the white liquors. Steep the cloth for twelve hours at 125 degrees of Fahrenheit, which forms what is called the white steep. The cloth being now thoroughly washed in cold water, and dried, is ready to receive, first, the pink mordant, which is composed as follows: —take equal quantities, by measurement, of a decoction of galls, at the strength of four to six, and a solution of alum at one half degree, the alum being previously saturated with whitening, or any other alkali, in the proportion of 1 ounce to the pound weight of alum; mix them together, and raise the temperature to 140 degrees of Fahrenheit, or as hot as can be handled. By immersion, as formerly mentioned, in this mixture, the cloth when dyed and cleared, exhibits a beautiful pink, equal, if not superior, to that produced by cochineal.

To dye silks and satins brown in the small way.

Fill the copper with river water, when it gently boils, put in a quarter of a pound of chipped fustic, two ounces of madder, one ounce of sumach, and half an ounce of cam-wood; but if not required to be so red, the cam-wood may be omitted. These should boil, at least, from half an hour to two hours, that the ingredients may be well incorporated. The copper must then be cooled down by pouring in cold water: the goods may then be put in, and simmered gently from half an hour to an hour. If this colour should appear to want darkening, or saddening, it may be done by taking out the goods, and adding a small quantity of old black liquor; a small piece of green copperas may be used; rinse in two or three waters, and hang up to dry.

To dye silks of fawn colour drabs.

Boil one ounce of fustic, half an ounce of alder bark, and two drachms of archil. From one to four drachms of the best crop madder must be added to a very small quantity of old black liquor, if it be required darker.

To dye a silk shawl scarlet.

First dissolve two ounces of white soap in boiling water, handle the shawl through this liquor, now and then rubbing such places with the hands as may appear dirty, till it is as clean as this water will make it. A second, or even a third liquor may be used, if required: the shawl must be rinsed out in warm water.

Then take half an ounce of the best Spanish annatto, and dissolve it in hot water; pour this solution into a pan of warm water, and handle the shawl through this for a quarter of an hour; then take it out and rinse it in clean water. In the meanwhile dissolve a piece of alum of the size of a horse-bean in warm water, and let the shawl remain in this half an hour; take it out and rinse it in clear water. Then boil a quarter of an ounce of the best cochineal for twenty minutes, dip it out of the copper into a pan, and let the shawl remain in this from twenty minutes to half an hour, which will make it a full blood red. Then take out the shawl, and add to the liquor in the pan a quart more than that out of the copper, if there is as much remaining, and about half a small wine-glassful of the solution of tin: when cold, rinse it slightly out in spring water.

To dye a silk shawl crimson.

Take about a table-spoonful of cudbear, put it into a small pan, pour boiling water upon it, stir and let it stand a few minutes, then put in the silk, and turn it over a short time, and when the colour is full enough, take it out: but if it should require more violet or crimson, add a spoonful or two of purple archil to some warm water, and dry it within doors. To finish it, it must be mangled or calendered, and may be pressed if such a convenience is at hand.

To dye silk lilac.

For every pound of silk, take one pound and a half of archil, mix it well with the liquor; make it boil a quarter of an hour, dip the silk quickly, then let it cool, and wash it in river water, and a fine half violet, or lilac, more or less full, will be obtained.

To dye thick silks, satins, silk stockings, &c. of a flesh colour.

Wash the stockings clean in soap and water, then rinse them in hot water; if they should not then appear perfectly clear, cut half an ounce of white soap into thin slices, and put it into a saucepan half full of boiling water; when this soap is dissolved, cool the water in the pan, then put in the stockings, and simmer for twenty minutes: take them out, and rinse in hot water; in the interim pour three table spoonsful, of purple archil into a wash-hand basin half full of hot water; put the stockings in this dye water, and when of the shade called half violet or lilac, take them from the dye water, and slightly rinse them in cold; when dry hang them up in a close room in which sulphur is burnt; when they are evenly bleached to the shade required of flesh colour, take them from the sulphuring-room, and finish them by rubbing the right side with a clean flannel. Some persons calender them afterwards. Satins and silks are done the same way.

To dye silk stockings black.

These are dyed like other silks excepting that they must be steeped a day or two in black liquor, before they are put into the black silk dye. At first they will look like an iron grey; but, to finish and black them, they must be put on wooden legs, laid on a table, and rubbed with the oily rubber, or flannel, upon which is oil of olives, and then the more they are rubbed the better. Each pair ot stockings will require half a table spoonful of oil, at least, and half an hour's rubbing, to finish them well. Sweet oil is the best in this process, as it leaves no disagreable smell.

To dye straw and chip bonnets black.

Chip hats being composed of the shavings of wood, are stained black in various ways. First by being boiled in strong logwood liquor three or four hours; they must be often taken out to cool in the air, and now and then a small quantity of green copperas must be added to the liquor, and this continued for several hours. The saucepan or kettle they are dyed in may remain with the bonnets in it all night; the next morning they must be taken out and dried in the air, and brushed with a soft brush. Lastly, a sponge is dipped in oil, and squeezed almost to dryness; with this the bonnets are rubbed all over, both inside and out, and then sent to the blockers to be blocked. Others boil them in logwood; and instead of green copperas, use steel filings steeped in vinegar; after which they are finished as above.

To dye straw bonnets brown.

Take a sufficient quantity of Brazil wood, sumach, bark, madder, and copperas, and sadden, according to the shade required.

To remove the stain of light colours from the hands.

Wash the hands in soap and water, in which some pearl-ash is dissolved.

To dye black cloth green.

Clean the cloth well with bullock's gall and water, and rinse in warm water; then make a copper full of river water boiling hot, and take from one pound to one pound and a half of fustic; put it in, and boil it twenty minutes, to which add a lump of alum of the size of a walnut; when this is dissolved in the copper, put in the coat, and boil it twenty minutes; then take it out, and add a small wine glass, three parts full, of chemic blue, and boil again from half an hour to an hour, and the cloth will be a beautiful dark green; then wash out and dry.

Calico printing.

This art consists in dyeing cloth with certain colours and figures upon a ground of a different hue; the colours, when they will not take hold of the cloth readily, being fixed to them by means of mordants, as a preparation of alum, made by dissolving 3 lbs. of alum and 1 lb. of acetate of lead in 8 lbs. of warm water. There are added at the same time, 2 ounces of potash, and 2 ounces of chalk.

Acetate of iron, also, is a mordant in frequent use in the printing of calicoes; but the simple mixture of alum and acetate of lead is found to answer best as a mordant.

To apply the mordants.

The mordants are applied to the cloth, either with a pencil, or by means of blocks, on which the pattern, according to which the cotton is to be printed, is cut. As they are applied only to particular parts of the cloth, care must be taken that none of them spread to the part of the cloth which is to be left white, and that they do not interfere with each other when several are applied; it is necessary, therefore, that the mordants should be of such a degree of consistence, that they will not spread beyond those parts of the cloth on which they are applied. This is done by thickening them with flour or starch, when they are to be applied by the block, and with gum arabic when they are to be put on with the pencil. The thickening should never be greater than is sufficient to prevent the spreading of the mordants: when carried too far, the cotton is apt not to be sufficiently saturated with the mordants, and of course the dye takes but imperfectly.

In order that the parts of the cloth impregnated with mordants may be distinguished by their colour, it is usual to tinge the mordants with some colouring matter. The printers commonly use the decoction of Brazil wood for this purpose.

Sometimes, the two mordants are mixed together in different proportions; and sometimes one or both is mixed with an infusion of sumac, or of nut-galls. By these contrivances a great variety of colours are produced by the same dye-stuff.

Process of dyeing, &c.

After the mordants have been applied, the cloth must be completely dried. It is proper for this purpose to employ heat, which will contribute towards the separation of the acetous acid from its base, and towards its evaporation; by which means the mordant will combine in a greater proportion, and more intimately with the cloth.

When the cloth is sufficiently dried, it is to be washed with warm water and cow-dung: till the flower or gum employed to thicken the mordants, and all those parts of the mordants which are uncombined with the cloth, are removed. After this, the cloth is to be thoroughly rinsed in clean water.

Dye-stuffs.

Almost the only dye-stuffs employed by calico-printers are indigo, madder, and quercitron bark, or weld; but this last substance is little used, except for delicate greenish yellows. The quercitron bark gives colours equally good; and is much cheaper and more convenient, not requiring so great a heat to fix it. Indigo, not requiring any mordant, is commonly applied at once, either by a block or by a pencil. It is prepared by boiling together indigo and potash, made caustic by quick lime and orpiment; the solution is afterwards thickened with gum. It must be carefully secluded from the air, otherwise the indigo would soon be regenerated, which would render the solution useless. Dr. Bancroft has proposed to substitute coarse brown sugar for orpiment: it is equally efficacious in decomposing the indigo, and rendering it soluble; while it likewise serves all the purposes of gum. Some calicoes are only printed of one colour, others have two, and others three or more, even to the number of eight, ten, or twelve. The smaller the number of colours, the fewer in general, are the processes.

To print yellow.

For yellow, the black is besmeared with acetate of alumine. The cloth, after receiving this mordant, is dyed with quercitron bark, and is then bleached.

Nankeen yellow.

One of the most common colours on *cotton prints*, is a kind of nankeen yellow, of various shades down to a deep yellowish brown or drab. It is usually in stripes or spots. To produce it, the printers besmear a block, cut out into the figure of the print, with acetate of iron, thickened with gum or flour; and apply it to the cotton, which, after being dried and cleansed in the usual manner, is plunged into a potash ley. The quantity of acetate of iron is always proportioned to the depth of the shade.

Red.

Red is communicated by the same process, only madder is substituted for the bark.

Blue.

The fine light blues which appear so frequently on printed cottons, are produced by applying to the cloth a block besmeared with a composition, consisting partly of wax, which covers all those parts of the cloth which remain white. The cloth is then dyed in a cold indigo vat; and after it is dry, the wax composition is removed by hot water.

Lilac and brown.

Lilac, flea brown, and blackish brown, are given by means of acetite of iron; the quantity of which is always proportioned to the depth of the shade. For very deep colours a little sumac is added. The cotton is afterwards dyed in the usual manner with madder, and then bleached.

Green.

To twelve quarts of muriatic acid, add by degrees one quart of nitrous acid: saturate the whole with grain tin, and boil it in a proper vessel, till two-thirds are evaporated.

To prepare the indigo for mixing with the solution, take nine pounds of indigo, half a pound of orange orpiment, and grind it in about four quarts of water, mix it well with the indigo; and grind the whole in the usual way.

To mix the solution of tin with prepared indigo.

Take two gallons of the indigo prepared as above, then stir into it, by degrees, one gallon of the solution of tin, neutralized by as much caustic alkali as can be added without precipitating the tin from the acids. For a lighter shade of green, less indigo will be necessary. The goods are to be dipped in the way of dipping China blues; they must not, however, be allowed to drain, but moved from one vat to another as quickly as possible. They are to be cleansed in the usual way, in a sour vat of about 150 gallons of water to one gallon of sulphuric acid; they are then to be well washed in decoctions of weld, and other yellow colour drugs, and are to be branned or bleached till they become white in those parts which are required colourless.

To print dove colour and drab.

Dove colour and drab are given by acetite of iron and quercitron bark; the cloth is afterwards prepared in the usual manner.

To print different colours.

When different colours are to appear in the same print, a greater number of operations are necessary. Two or more blocks are employed; upon each of which, that part of the print only is cut, which is to be of some particular colour. These are besmeared with different mordants, and applied to the cloth, which is afterwards dyed as usual. Let us suppose, for instance, that these blocks are applied to cotton, one with acetite of alumine, another with acetite of iron, a third with a mixture of those two mordants, and that the cotton is then dyed with quercitron bark, and bleached. The parts impregnated with the mordants would have the following colours :—

Acetite of alumine, yellow. Acetite of iron, olive, drab, dove. The mixture, olive green, olive.

If the part of the yellow is covered over with the indigo liquor, applied with a pencil, it will be converted into *green*. By the same liquid, blue may be given to such parts of the print as require it.

If the cotton is dyed with madder, instead of quercitron bark, the print will exhibit the following colours :—

Acetite of alumine, red. Acetite of iron, brown, black. The mixture, purple.

When a greater number of colours are to appear; for instance, when those communicated by bark, and those by madder are wanted at the same time, mordants for parts of the pattern are to be applied: the cotton then is to be dyed in the madder bath, and bleached; then the rest of the mordants, to fill up the pattern, are added, and the cloth is again dyed with quercitron bark, and bleached. The second dyeing does not much affect the madder colours; because the mordants, which render them permanent, are already saturated. The yellow tinge is easily removed by the subsequent bleaching. Sometimes a new mordant is also applied to some of the madder colours, in consequence of which, they receive a new permanent colour from the bark. After the last bleaching, new colours may be added by means of the indigo liquor. The following table will give an idea of the colours which may be given to cotton by these processes.

I. *Madder dye.*—Acetite of alumine, red. Acetite of iron, brown, black. Acetite diluted, lilac. Both mixed, purple.

II. *Black dye.*—Acetite of alumine, yellow. Acetite of iron, dove, drab. Lilac and acetite of alumine, olive. Red and acetite of alumine, orange.

III. *Indigo dye.*—Indigo, blue. Indigo and yellow, green.

To prepare a substitute for gum used in calico printing.

Collect half a ton weight of scraps of pelts or skins, or pieces of rabbit or sheep skins, and boil them together for seven or eight hours, in 350 gallons of water, or until it becomes a strong size. Then draw it off, and when cold, weigh it. Warm it again, and to every hundred weight, add 4 gallons of the strongest sweet wort that can be made from malt, or 20 pounds weight of sugar. When incorporated, take it off, and put it into a cask for use.

This substitute for gum may be used by calico printers in mixing up nearly all kinds of colours. By using a sixth part only of gum with it, it will also improve the gum, and be a saving of 200 per cent, and without gum, of 400 per cent. It will also improve and preserve the paste so much used by printers.

To prepare anatto for dyeing.

Anatto is a colouring fecula of a resinous nature, extracted from the seeds of a tree very common in the West Indies, and which in height never exceeds 15 feet.

The Indians employ two processes to obtain the red fecula of these seeds. They first pound them, and mix them with a certain quantity of water, which in the course of five or six days favours the progress of fermentation. The liquid then becomes charged with the colouring part; and the superfluous moisture is afterwards separated by slow evaporation over the fire, or by the heat of the sun.

Another method.

This consists in rubbing the seeds between the hands in a vessel filled with water. The colouring part is precipitated, and forms itself into a mass like a cake of wax; but if the red fecula, thus detached, is much more beautiful than in the first process, it is less in quantity. Besides, as the splendour of it is too bright, the Indians are accustomed to weaken it by a mixture of red sandal wood.

Use of anatto.

The natives of the East India islands used formerly to employ anatto for painting their bodies, &c. at present, it is applied in Europe, to the purposes of dyeing. It is employed to give the first tint to woollen stuffs, intended to be dyed red, blues, yellows, green, &c

In the art of the varnisher it forms part of the composition of changing varnishes, to give a cold colour to the metals to which these varnishes are applied.

To choose anatto.

It ought to be chosen of a flame colour, brighter in the interior part than on the outside, soft to the touch, and of a good consistence. The paste of anatto becomes hard in Europe; and it loses some of its odour, which approaches near to that of violets.

To prepare litmus.

The Canary and Cape de Verd islands produce a kind of litchen or moss which yields a violet colouring part, when exposed to the contact of ammonia disengaged from urine, in a state of putrefaction, by a mixture of lime. When the processes are finished it is known by the name of litmus.

This article is prepared on a large scale at London, Paris, and Lyons. In the latter city another kind of litchen, which grows on the rocks like moss is employed.

The ammonia joins the resinous part of the plant, developes its colouring part, and combines with it. In this state the litchen forms a paste of a violet red colour, interspersed with whitish spots, which give it a marble appearance.

Litmus is employed in dyeing, to communicate a violet colour to silk and woollen. It is used also for colouring the liquor of thermometers.

To prepare bastard solution.

The flowers of this plant contain two colouring parts: one soluble in water, and which is thrown away; the other soluble in alkaline liquors. The latter colouring part becomes the basis of various beautiful shades of cherry colour, ponceau, rose-colour, &c. It is employed for dyeing feathers, and constitutes the vegetable red, or Spanish vermilion employed by ladies to heighten their complexion.

Carthamus cannot furnish its resinous colouring part, provided with all its qualities, until it has been deprived of that which is soluble in water. For this purpose, the dried flowers of the carthamus are enclosed in a linen bag, and the bag is placed in a stream of running water. A man with wooden shoes gets upon the bag every eight or ten hours, and treads it on the bank until the water expressed from it is colourless.

These moist flowers, after being strongly squeezed in the bag, are spread out on a piece of canvas extended on a frame, placed over a wooden box, and covered with five or six per cent. of their weight of carbonate of soda. Pure water is then poured over them; and this process is repeated several times, that the alkali may have leisure to become charged with the colouring part which it dissolves. The liquor, when filtered is of a dirty red, and almost brown colour. The colouring part, thus held in solution, cannot be employed for colouring bodies until it is free; and to set it at liberty, the soda must be brought into contact with a body which has more affinity for it. It is on this precipitation, by an intermediate substance, that the process for making Spanish vermilion is founded, as well as all the results arising from the direct application of this colouring part, in the art of dyeing.

Utility of sheep's dung.

This article is used in dyeing, for the purpose of preparing cotton and linen to receive certain colours, particularly the red madder and cross-wort, which it performs by impregnating the stuffs with an animal mucilage, of which it contains a large quantity, and thus assimilating them to wool and silk.

To prepare woad.

This is effected from the leaves of the plant so called, by grinding them to a paste, of which balls are made, placed in heaps, and occasionally sprinkled with water to promote the fermentation: when this is finished the woad is allowed to fall into a coarse powder used as a blue dye-stuff.

To prepare indigo.

This dye is derived from the leaves and the young shoots of several species of indigo plants, by soaking them either in cold water, or still better in water kept warm, and at about 160° Fahr. till the liquor becomes a deep green; it is then drawn off and beat or churned till blue flakes appear, when lime water is added, the yellow liquor drawn off, and the blue sediment dried, and formed into lumps.

To prepare carmine.

Boil one ounce troy of cochineal finely powdered in 12 or 14 pints of rain or distilled water, in a tinned copper vessel for three minutes, then add 25 grains of alum, and continue the boiling for two minutes longer, and let it cool; draw off the clear liquor as soon as it is only blood warm, very carefully into shallow vessels, and put them by, laying a sheet of paper over each of them, to keep out the dust for a couple of days, by which time the carmine will have settled. In case the carmine does not separate properly, a few drops of a solution of green vitriol will throw it down immediately. The water being drawn off, the carmine is dried in a warm stove, the first coarse sediment serves to make Florence lake; the water drawn off is liquid rouge.

To obtain a dyeing matter from potato tops.

Cut off the tops when it is in flower, and extract the juice, by bruising and pressing it. Linen or woollen imbibed in this liquor forty-eight hours, will take a brilliant, but solid and permanent yellow colour. If the cloth be afterwards plunged in a blue dye, it will acquire a beautiful permanent green colour. As to the mode of execution, it should pass through the hands of a chemist or skilful dyer, to derive all the advantages it is capable of furnishing.

To print carpets.

These carpets are made of knitted wool, by means of a machine: they are afterwards pressed and receive all the colours and designs wished for. These designs, printed on the tissue by means of wooden boards, are extremely neat; the colours are very brilliant, and resist the rubbing extremely well, provided they traverse the tissue from one part to another.

These new carpets are warm, and have the advantage of being cheaper than other carpets; they last as long, and are not crossed by seams disagreeable to the eye, even on a breadth of from twelve to fifteen feet.

To dye hats.

The hats should be first strongly galled by boiling them a long time in a decoction of galls with a little logwood, that the dye may penetrate the better into their substance: after which a proper quantity of vitriol and decoction of logwood, with a little verdigris, are added, and the hats continued in this mixture for a considerable time. They are afterwards put into fresh liquor of logwood, galls, vitriol and verdigris; and where the hats are of great price, or of a hair which with difficulty takes the dye, the same process is repeated a third time. For obtaining the most perfect colour, the hair or wool is dyed blue previously to its being formed into hats.

Another method.

Boil 100 pounds of logwood, 12 pounds of gum, and 6 pounds of galls, in a proper quantity of water for some hours; after which, about 6 pounds of verdigris and 10 of green vitriol are added, and the liquor kept just simmering, or of a heat a little below boiling. Ten or twelve dozen of hats are immediately put in, each on its block, and kept down by cross bars for about an hour and a half; they are then taken out and aired, and the same number of others put in their room. The two sets of hats are thus dipped and aired alternately, eight times each; the liquor being refreshed each time with more of the ingredients, but in less quantity than at first.

MISCELLANEOUS RECEIPTS FOR DYEING, STAINING, &c.

To turn red hair black.

Take a pint of the liquor of pickled herrings, half a pound of lamp-black, and two ounces of the rust of iron. Mix and boil them for twenty minutes, then strain and rub the liquid well into the roots of the hair.

To change the colour of hair.

This is done by spreading the hair to bleach on the grass like linen, after first washing it out in a lixivious water. This ley, with the force of the sun and air, brings the hair to a perfect whiteness. There is also a method of dyeing hair with bismuth, which renders such white hair as borders too much upon the yellow, of a bright silver colour.

Hair may be changed from a red, grey, or other disagreeable colour, to a brown or deep black, by a solution of silver. The liquors sold under the name of *hair waters*, are, in fact, no more than solutions of silver in aqua-fortis, largely diluted with water, with the addition of ingredients, which contribute nothing to their efficacy. The solution should be fully saturated with the silver, that there may be no more acid in it than is necessary for holding the metal dissolved; and besides dilution with water, a little spirit of wine may be added for the further decomposition of the acid. For diluting the solution, distilled water, or pure rain-water, must be used; the common spring-waters turning it milky, and precipitating a part of the dissolved silver. It is to be observed also, that if the liquor touches the skin, it has the same effect on it as on the matter to be stained, changing the part moistened with it to an indelible black. Hair may also be dyed of any colour in the same manner as wool.

To dye bristles or feathers green.

Take of verdigris and verditer, each 1 ounce, gum water 1 pint; mix them well, and dip the bristles or feathers, they having been first soaked in hot water, into the said mixture.

Blue.—Take of indigo and risse, each 1 ounce, and a piece of alum the size of a hazel nut; put them into gum water, and dip the materials into it hot, hang them up to dry, and clap them well that they may open, and by changing the colours, the aforesaid materials may be in this manner dyed of any colour; for purple, use lake and indigo; for carnation, vermilion and smalt.

Red.—Take an ounce of Brazil wood in powder, half an ounce of alum, a quarter of an ounce of vermilion, and a pint of vinegar, boil them up to a moderate thickness, and dip the bristles or feathers, they having been first soaked in hot water, into the said mixture.

To dye or colour horse hair.

Steep in water wherein a small quantity of turpentine has been boiled for the space of two hours; then having prepared the colours very hot, boil the hair therein, and any colour, black excepted, will take, but that will only take a dark red or dark blue, &c.

To dye gloves.

Take the colour suitable for the occasion; if dark take Spanish brown and black earth; if lighter, yellow and whiting; and so on with other colours: mix them with a moderate fire, daub the gloves over with the colour wet, and let them hang till they are dry, then beat out the superfluity of the colour, and smooth them over with a stretching or sleeking stick, reducing them to their proper shade.

To dye white gloves purple.

Boil four ounces of logwood and two ounces of roche alum in three pints of soft water till half wasted. Let the liquor stand to cool after straining. Let the gloves be nicely mended, then with a brush rub them over, and when dry repeat it. Twice is sufficient, unless the colour is to be very dark: when dry, rub off the loose dye with a coarse cloth; beat up the white of an egg, and with a sponge rub it over the leather. The dye will stain the hands, but wetting them with vinegar before they are washed will take it off.

To dye gloves resembling Limerick.

Brown, or tan colours, are readily imparted to leather gloves, by the following simple process. Steep saffron in boiling soft water for about twelve hours: then having slightly sewed up the tops of the gloves to prevent the dye staining the insides, wet them over with a sponge or soft brush dipped into the liquid.

The quantity of saffron as well as of water, will of course depend on how much dye may be wanted, and their relative proportions on the depth of colour required. A common tea-cup will contain sufficient in quantity for a single pair of gloves.

To tinge bone and ivory red.

Boil shavings of scarlet cloth in water. When it begins to boil, throw in a quarter of a pound of ashes made from the dregs of wine, which will extract the colour; then throw in a little roche alum to clear it, and pass the water through a linen cloth. Steep the ivory or bone in aqua-fortis, and put into the water. If it is necessary to leave white spots, cover the place destined for them with wax.

Black.—Take a double handful of lime, and slack it by sprinkling it with water: stir it up together, let it settle ten minutes, and pour the water into a pan. Then take the ivory, &c. and steep it in the lime water 24 hours, after which, boil it in strong alum water one hour, and dry it in the air.

Another method.

Steep the bone or ivory during five or six days, in water of galls, with ashes made with dried dregs of wine and arsenic; then give it two or three layers of the same black, with which plumtree is blackened in order to imitate ebony.

Or dissolve silver in aqua-fortis, and put into it a little rose-water. Rub the ivory with this, and allow it to dry in the sun.

Green.—This colour is imparted to ivory or bone by a solution of copper or verdigris in aqua-fortis, or by grinding together two parts of verdigris, and one of sal-ammoniac.

Purple.—Take four ounces of aqua-regia, and one of sal-ammoniac.

Yellow.—Ivory, bone, horn, &c. may be stained *yellow*, by previously boiling them in a solution of one pound of alum, in two quarts of water, then immersing them for half an hour in a liquor prepared by boiling half a pound of turmeric in a gallon of water, until it be reduced to three quarts, and afterwards plunging the coloured substance into alum water.

Blue.—All bony matters may be stained blue, by first tinging them with green, and then dipping them into a hot and strong solution of pearl-ashes.

To prepare wood for dyeing.

The wood mostly used to dye black, is pear-tree, holly, and beach, all of which take a beautiful black colour. Do not use wood that has been long cut, or aged, but let it be as fresh as possible. After the veneers have had one hour's boiling, and then taken out to cool, the colour is always much stronger. When dyed, they should be dried in the air, and not by the fire, nor in a kiln of any kind, as artificial heat tends to destroy the colour.

In order to dye blue, green, red or other colours, take clear holly. Put the veneers into a box or trough, with clear water, and let them remain four or five days, changing the water once or twice as occasion may require, the water will clear the wood of slime, &c. Let them dry about twelve hours before they are put into the dye; by observing this, the colour will strike quicker, and be of a brighter hue.

To prepare blue turnsole for staining wood.

Boil four ounces of turnsole in a pint and a half of water, in which lime has been slaked.

To stain oak a mahogany colour.

Boil together Brazil wood and Roman alum, and before it is applied to the wood, a little potash is to be added to it. A suitable varnish for wood, thus tinged, may be made by dissolving amber in oil of turpentine, mixed with a small portion of linseed oil.

Ebony Black.

Steep the wood for two or three days in luke-warm water, in which a little alum has been dissolved; then put a handful of logwood, cut small, into a pint of water, and boil it down to less than half a pint. If a little indigo is added, the colour will be more beautiful. Spread a layer of this liquor quite hot on the wood with a pencil, which will give it a violet colour. When it is dry, spread on another layer; dry it again, and give it a third: then boil verdigris at discretion in its own vinegar, and spread a layer of it on the wood: when it is dry, rub it with a brush, and then with oiled chamois skin. This gives a fine black, and imitates perfectly the colour of ebony.

Another method.

After forming the wood into the destined figure, rub it with aqua-fortis a little diluted. Small threads of wood will rise in the drying, which is to be rubbed off with pumice-stone. Repeat this process again, and then rub the wood with the following composition; put into a glazed earthen vessel a pint of strong vinegar, two ounces of fine iron filings, and half a pound of pounded galls, and allow them to infuse for three or four hours on hot cinders. At the end of this time augment the fire, and pour into the vessel four ounces of copperas (sulphate of iron,) and a chopin of water having half an ounce of borax, and as much indigo dissolved in it; and make the whole boil till a froth rises. Rub several layers of this upon the wood; and, when it is dry, polish it with leather on which a little tripoli has been put.

To stain beech-wood a mahogony colour.

Break two ounces of dragon's blood in pieces, and put them into a quart of rectified spirit of wine; let the bottle stand in a warm place, and shake it frequently. When dissolved it is fit for use.

Another method.

Boil one pound of logwood in four quarts of water, and add a double handful of walnut peeling. Boil it up again, take out the chips, add a pint of the best vinegar, and it will be fit for use.

To stain musical instruments Crimson.

Boil one pound of ground Brazil-wood in three quarts of water for an hour; strain it, and add half an ounce of cochineal; boil it again for half an hour gently, and it will be fit for use.

Purple.

Boil a pound of chip logwood in three quarts of water for an hour; then add four ounces of pearl-ash, and two ounces of indigo pounded.

To stain box-wood brown.

Hold the work to the fire, that it may receive a gentle warmth; then take aqua-fortis, and with a feather pass it over the work, till it changes to a fine brown. Then oil and polish it.

To dye wood a silver grey.

Let not the veneers be too dry; when put into the copper, pour hot iron liquor (acetite of iron) over them, and add one pound of chip-logwood with two ounces of bruised nut-galls. Then boil up another pot of iron liquor to supply the copper, keeping the veneers covered and boiling two hours a day, until thoroughly penetrated.

Bright yellow.—A very small bit of aloes put into the varnish, will make the wood of a good yellow colour.

Another method.

Reduce four pounds of the roots of barberry, by sawing into dust, which put in a copper or brass pan, add four ounces of turmeric, to which put four gallons of water, then put in as many holly veneers as the liquor will cover; boil them together for three hours, often turning them. When cool, add two ounces of aqua-fortis, and the dye will strike through much sooner.

Bright green.—Proceed as before to produce a yellow; but instead of aqua-fortis, add as much of the vitriolated indigo as will produce the desired colour.

Another method.

To three pints of the strongest vinegar, add four ounces of the best verdigris, ground fine, half an ounce of sap-green, and half an ounce of indigo. Proceed in straining as before.

Bright red.—To two pounds of genuine Brazil-dust, add 4 gallons of water, put in as many veneers as the liquor will well cover, boil them for three hours, and let them cool; then add two ounces of alum, and two ounces of aqua-fortis, and keep it luke-warm until it has struck through.

Purple.—To two pounds of chip-logwood, and half a pound of Brazil-dust, and four gallons of water. Put in the veneers, and boil them well; then add six ounces of pearl-ash and two ounces of alum; let them boil two or three hours every day, till the colour has struck through.

Fine blue.—Into a pound of oil of vitriol in a glass bottle, put four ounces of indigo, and proceed as before directed.

To stain paper or parchment.—Yellow.

Paper may be stained a beautiful yellow by the tincture of turmeric formed by infusing an ounce or more of the root, powdered, in a pint of spirit of wine. This may be made to give any tint of yellow, from the lightest straw to the full colour, called French yellow, and will be equal in brightness even to the best dyed silks. If yellow be wanted of a warmer or redder cast, annatto, or dragon's blood, must be added. The best manner of using these, and the following tinctures, is to spread them even on the paper, or parchment, by means of a broad brush, in the manner of varnishing.

Crimson.—A very fine crimson stain may be given to paper by a tincture of the Indian lake. which may be made by infusing the lake some days in spirit of wine, and then pouring off the tincture from the dregs. It may be stained red by red ink. It may also be stained of a scarlet hue by the tincture of dragon's blood in spirit of wine, but this will not be bright.

Green.—Paper or parchment may be stained green, by the solution of verdigris in vinegar, or by the crystals of verdigris dissolved in water.

Orange.—Stain the paper or parchment first of a full yellow, by means of the tincture of turmeric; then brush it over with a solution of fixed alkaline salt, made by dissolving half an ounce of pearl-ashes, or salt of tartar, in a quart of water, and filtering the solution.

Purple.—Paper or parchment may be stained purple, by archil, or by the tincture of logwood. The juice of ripe privet berries expressed will likewise give a purple dye.

To marble the edges of books or paper.

Dissolve four ounces of gum arabic in two quarts of clear water; then provide several colours mixed with water in pots or shells, and with pencils peculiar to each colour, sprinkle them by way of intermixture upon the gum-water, which must be put into a trough, or some broad vessel; then with a stick curl them or draw them out in streaks, to as much variety as required. Having done this, hold the book or books close together, and only dip the edges in, on the top of the water and colours very lightly; which done, take them off, and the plain impression of the colours in mixture will be upon the leaves; doing as well the ends, as the front, of the book the same manner.

To marble the covers of books.

This is performed by forming clouds with aqua-fortis or spirit of vitriol, mixed with ink, and afterwards glazing the covers.

To colour vellum green.

Take half a pint of the best white wine vinegar, an ounce of verdigris, and half an ounce of sap green; dissolve them in the vinegar for a few days, having been heated by the fire. Shake the bottle frequently before it is used.

Wash the vellum over with weak potash water, and when dry, colour it with the green three or four times, till it has a good colour: when dry, wash it over with thin paste water, to give the vellum a gloss.

To black the edges of paper.

Mix black lead with ink, and when the paper is cut, colour it thinly over with black ink, with a piece of fine cloth; rub on the black-lead, covering every part; take the dog's-tooth, and burnish the edge till it becomes well polished.

When the edge of the paper, after cutting, appears rather rough, scrape it over with a piece of glass or an iron scraper, with a flat edge.

To sprinkle the edges of books, &c.

The brushes used for book-edges, must be made of Russia hogs' bristles, of good thickness, tied round with cord, glued at the thick end, and half covered with a piece of leather: when dry, tie the brush again with waxed cord, within half an inch of the soft part of it, and cut it very smooth and even. Brushes made after this manner are preferable to those with a handle.

Prepare the colour in a cup; dip in the brush till it is charged, and then press it out till it will drop no longer. The book must be screwed tight in the cutting press: hold the brush in the left hand, and, with a folding-stick in the right, rub it over the brush, which will cause the colour to sprinkle finely on the edges. The brush must be moved up and down over the edge, as you sprinkle, to have it regular on every part. After the sprinkling is done, the brushes should be carefully washed in water, particularly after sprinkling blue, which will otherwise soon destroy the brush.

To dye or stain horn tortoise-shell colour.

The horn to be dyed must be first pressed into proper plates, scales, or other flat form, and the following mixture prepared: Take of quick-lime two parts, and litharge one part, temper them together to the consistence of a soft paste, with soap-ley. Put this paste over all the parts of the horn, except such as are proper to be left transparent, in order to give it a near resemblance to the tortoise-shell. The horn must remain in this manner, covered with the paste, till it is thoroughly dry; when, the paste being brushed off, the horn will be found partly opaque and partly transparent, in the manner of tortoise-shell, and when put over a foil of the kind of lattern, called orsedue, will be scarcely distinguishable from it. It requires some degree of fancy and judgment to dispose of the paste in such a manner as to form a variety of transparent parts, of different magnitudes; and figures to look like the effect of nature: and it will be an improvement to add semi-transparent parts, which may be done by mixing whiting with some of the paste, to weaken its operation in particular places, by which spots of a reddish-brown will be produced, which, if properly interspersed, especially on the edges of the dark parts, will greatly increase the beauty of the work, and its similitude to real tortoise-shell.

Another method.

Take an equal quantity of quick-lime and red lead, and mix it up with strong soap lees. Lay it on the horn with a small brush, like the mottle in tortoise-shell. When dry, repeat the same two or three times.

To dye horns of different colours.

Black is performed by steeping brass in aqua fortis till it is turned green: with this the horn is to be washed once or twice, and then put into a warmed decoction of logwood and water.

Green is begun by boiling it, &c. in alum-water, then with verdigris, ammoniac, and white wine vinegar, keeping it hot therein till sufficiently green.

Red is begun by boiling it in alum water, then with verdigris, ammoniac, and finished by decoction in a liquor compounded of quick-lime steeped in rain-water, strained, and to every pint an ounce of Brazil wood added. In this decoction the horns are to be boiled till sufficiently red.

Horns receive a deep black stain from solution of silver. It ought to be diluted to such a degree as not sensibly to corrode the subject, and applied two or three times if necessary, at considerable intervals, the matter being exposed as much as possible to the sun, to hasten the appearance and deepening of the colour.

BLEACHING AND SCOURING.

To bleach cloths, &c.

The mode of bleaching which least injures the texture of cloth formed of vegetable substances, is that effected by merely exposing it in a moistened state to the atmosphere, having been steeped in a solution of potash or soda, but the length of time and other inconveniencies attending this process, led to the use of more active chemical operations.

It is by the combination of oxygen with the colouring matter of the cloth, that it is deprived of its hue, and the different processes employed must be adapted to prepare it for this combination, and render it as perfect as possible, without destroying its texture, an effect which, however, must necessarily ensue in a greater or less degree from the union of oxygen with all bodies. The operation of bleaching requires four distinct processes. First, to remove the spittle with which the threads are covered in the operation of spinning, and what is called the weaver's dressing. This may be effected by soaking the cloth for some hours in warm water, and then boiling it in an alkaline ley, prepared with 20 parts of water, and one part of the potash sold for this purpose, rendered more active, by being mixed with one-third of lime. After it has been boiled for some hours in this solution, it is to be well washed with water, and then exposed to the second process—the action of oxygen, which is best applied by means of the *oxymuriate of lime*, sold ready prepared for this purpose. The solution of *oxymuriate of lime* must be of such strength as nearly to destroy the colour of a solution of indigo in water, slightly acidulated with sulphuric acid. The cloth is to be alternately steeped in this liquor, and a solution (made as before directed,) four or five times, using fresh liquor at each process. It is then to be well rubbed and washed with soft soap and water, which prepares it for the last process.

The steeping is in a weak solution of sulphuric acid, and from 60 to 100 parts of water, the strength being thus varied according to the texture of the cloth. This dissolves the remaining colouring matter which had resisted the action of alkali, and the oxymuriate of lime, as well as a small quantity of iron contained in all vegetable matter. The cloth is then to be exposed to the air for some days, and watered, to carry off any remains of the acids, and remove the unpleasant odour it acquires from the oxymuriate of lime and potash.

To bleach linen, &c. by oxymuriatic acid.

To ascertain the strength of this acid for bleaching, a solution of indigo in the sulphuric acid is employed. The colour of this is destroyed by the oxygenated muriatic acid; according to the quantity of it that can be discoloured by a given quantity of the liquor, its strength is known.

In this country, machinery is employed for rinsing and beating; the apparatus must be arranged according to the objects to be bleached; the skeins of thread must be suspended in the tub destined for them, and the cloth must be rolled upon reels in the apparatus. When every thing is thus disposed, the tubs are filled with oxygenated muriatic acid, by introducing a funnel, which descends to the bottom of the tub, in order to prevent the dispersion of the gas. The cloth is wound on the frame work on which the skeins are suspended, is turned several times, until it is judged, by taking out a small quantity of the liquor from time to time, and trying it by the test of the solution of indigo, that it is sufficiently exhausted. The weakened liquor is then drawn off, and may be again employed for a new saturation.

To bleach by oxymuriate of lime.

To cause a large quantity of lime to combine with the oxymuriatic acid gas, the lime is mechanically suspended in the water, into which the gas is made to pass, and agitated, so as to present fresh matter to the gas. By this means the oxymuriate of lime is formed in a very convenient manner; it is dissolved in water, and used as a bleaching liquor.

This liquor is found to be preferable to the oxygenated muriatic acid and potass. At the great bleach-field in Ireland, four leys of potass are applied alternately with four weeks exposure on the grass, two immersions in the oxygenated muriate of lime, a ley of potash between the two, and the exposure of a week on the grass between each ley and the immersions. During summer, two leys and fifteen days' exposure are sufficient to prepare cloth for the oxygenated muriate; the three alternate leys, with immersions in the liquor, will be sufficient to complete the bleaching: nothing then will be necessary, but to wind the cloth through the sulphuric acid.

The oxygenated muriatic acid gas may also be combined with lime in a dry state, or the water may be avaporated, when it is employed for the formation of oxymuriates, which may then be very conveniently transported to any distance without injury to its detersive power.

To prepare the sulphuret of lime.

Take of sulphur or brimstone, in fine powder, four pounds; lime, well slaked and sifted, twenty pounds; water, sixteen gallons: these are to be well mixed, and boiled for about half an hour in an iron vessel, stirring them briskly from time to time. Soon after the agitation of boiling is over, the solution of the sulphuret of lime clears, and may be drawn off free from the insoluble matter, which is considerable, and which rests upon the bottom of the boiler. The liquor, in this state is pretty nearly the colour of small beer, but not quite so transparent.

To bleach by sulphuret of lime.

Sixteen gallons of fresh water are afterwards to be poured upon the insoluble dregs in the boiler, in order to separate the whole of the sulphuret from them. When this clears (being previously well agitated,) it is also to be drawn off and mixed with the first liquor; to these again, 33 gallons more of water may be added, which will reduce the liquor to a proper standard for steeping the cloth. Here we have (an allowance being made for evaporation, and for the quantity retained in the dregs) sixty gallons of liquor from four pounds of brimstone.

When linen is freed from the weaver's dressing, it is to be steeped in the solution of sulphuret of lime (prepared as above) for about twelve or eighteen hours, then taken out and very well washed. When dry, it is to be steeped in the oxymuriate of lime for twelve or fourteen hours, and then washed and dried. This process is to be repeated six times, that is, by six alternate immersions in each liquor, which has been found to whiten the linen.

Steam has been lately employed for bleaching with great success in France. The process was brought from the Levant. Chapel first made it known to the public.

To bleach cloth in this manner, it must be immersed in a slight alkaline caustic liquor, and placed in a chamber constructed over a boiler, into which is put the alkaline ley which is to be raised into steam. After the fire has been lighted, and the cloth has remained exposed to the action of the steam for a sufficient length of time, it is taken out, and immersed in the oxygenated muriate of lime, and afterwards exposed for two or three days on the grass. This operation, which is very expeditious, will be sufficient for cotton: but if linen cloth should retain a yellow tint, a second alkaline caustic vapour-bath, and two or three days on the grass, will be sufficient to give it the necessary degree of whiteness.

To bleach by alkalized steam.

In the process of bleaching by steam, the high temperature swells up the fibres of the thread or cloth; the pure alkali which rises with the elastic fluid, seizes with avidity on the colouring matter; and seldom does the tissue of the flax or hemp resist the penetrating effect of this vapour-bath. The whole matter, therefore, by which they are coloured, is attacked and decomposed by this single operation; and even if a part of it has been able to resist, nothing more is necessary but to repeat the operation, after a previous immersion and exposure on the grass, to ensure its complete effect. The alkali even appears to have a much livelier and more caustic action, when it is combined with caloric, than in ordinary leys, where the temperature never rises above 162 degrees of Fahrenheit. By making the cloth, or thread, pass through the ley of oxygenated muriate of lime, an union is effected between the solution and the carbon, arising from the extracto-mucous matter of the flax; carbonic acid is formed; the water even, in which this new compound is diluted, concurs to promote the combination; if the cloth is then exposed on the grass, the carbonic acid is dissipated, and the cloth is bleached.

To bleach cotton.

The first operation consists in scouring it in a slight alkaline solution; or what is better, by exposure to steam. It is afterwards put into a basket, and rinsed in running water. The immersion of cotton in an alkaline ley, however it may be rinsed, always leaves with it an earthy deposit. It is well known that cotton bears the action of acids better than hemp or flax; that time is even necessary before the action of them can be prejudicial to it; and by taking advantage of this valuable property in regard to bleaching, means have been found to free it from the earthy deposit, by pressing down the cotton in a very weak solution of sulphuric acid, and afterwards removing the acid by washing, lest too long remaining in it should destroy the cotton.

To bleach wool.

The first kind of bleaching to which wool is subjected, is to free it from grease. This operation is called scouring. In manufactories, it is generally performed by an ammoniacal ley, formed of five measures of river water and one of stale urine; the wool is immersed for about 20 minutes in a bath of this mixture, heated to fifty-six degrees: it is then taken out, suffered to drain, and then rinsed in running water: this manipulation softens the wool, and gives it the first degree of whiteness; it is then repeated a second, and even a third time, after which the wool is fit to be employed. In some places, scouring is performed with water slightly impregnated with soap; and, indeed, for valuable articles, this process is preferable, but it is too expensive for articles of less value.

Sulphurous acid gas unites very easily with water, and in this combination it may be employed for bleaching wool and silk.

To prepare the sulphurous acid.

The most economical method is, to decompose sulphuric acid, by the mixture of any combustible matter capable of taking from it any part of its oxygen. In exact experiments of the laboratory, when the chemist is desirous of having it in great purity, it is obtained by means of metallic substances, and particularly by mercury; but for the purpose of which we are treating, where great economy is required, we should recommend the most common substances. Take chopped straw, or saw dust, and introduce it into a matrass: pour over it sulphuric acid, applying at the same time heat, and there will be disengaged sulphurous acid gas, which may be combined with water in an apparatus.

The pieces are rolled upon the reels, and are drawn through the sulphurous acid by turning them, until it is observed that the whiteness is sufficiently bright. They are then taken out, and are left to drain on a bench covered with cloth, lest they should be stained in consequence of the decomposition of the wood by the sulphurous acid; they are next washed in river water, and Spanish white is employed, if it should be judged necessary. This operation is performed by passing the pieces through a tub of clear water, in which about eight pounds of Spanish white has been dissolved. To obtain a fine whiteness, the stuffs in, general, are twice sulphured. According to this process, one immersion, and reeling two or three hours, are sufficient. Azuring, or blueing, is performed by throwing into the Spanish-white liquor a solution of one part of Prussian blue to 400 parts of water; shaking the cloth in the liquid, and reeling it rapidly. The operation is terminated by a slight washing with soap, to give softness and pliability to the stuffs.

To full cloths, woollens, &c.

The method of fulling woollen stuffs, with soap, is this: a coloured cloth, of about 45 ells, is to be laid in the usual manner in the trough of a fulling mill, without first soaking it in water, as is commonly practised in many places. To full this trough of cloth, 15 pounds of soap are required, one-half of which is to be melted in two pails of river, or spring water, made as hot as the hand can well bear it. This solution is to be poured by little and little upon the cloth, in proportion as it is laid in the trough; after which it is to be taken out and stretched. This done, the cloth is immediately returned in the same trough without any new soap, and there fulled for two hours more. Then taken out, it is wrung well, to express all the grease and filth. After the second fulling, the remainder of the soap is dissolved in as in the former, and cast four different times on the cloth, remembering to take out the cloth every two hours to stretch it, and undo the plaits and wrinkles it has acquired in the trough. When sufficiently fulled, and brought to the quality and thickness required, scour it in hot water, keeping it in the trough till it is quite clean. As to white cloths, as these full more easily and in less time than coloured ones, a third part of the soap may be spared.

To prepare an improved bleaching liquor.

This is effected by a dissolution in water of the oxygenated muriates of calcareous earth, barytes, strontites, or magnesia. The earths should be prepared in the dry way, by bringing them in a solid form, in powder, or in paste, in contact with the oxygenated muriatic acid gas. So prepared, dissolve them in water, and apply them to the substance required to be bleached. By this mode, colours may be removed from linen, cotton, and vegetable and animal substances.

Another.

Take of salts, 8 parts, sulphuric acid, 5 do. black oxyde of manganese, 3 do. water, 3 do.

To bleach silk.

Take a solution of caustic soda, so weak as to make only a fourth of a degree, at most, of the areometer for salts, and fill with it the boiler of the apparatus for bleaching with steam. Charge the frames with skeins of raw silk, and place them in the apparatus until it is full; then close the door, and make the solution boil. Having continued the ebullition for twelve hours, slacken the fire, and open the door of the apparatus. The heat of the steam, which is always above 250 degrees, will have been sufficient to free the silk from the gum, and to scour it. Wash the skeins in warm water; and having wrung them, place them again on the frames in the apparatus, to undergo a second boiling. Then wash them several times in water, and immerse them in water somewhat soapy, to give them a little softness. Notwithstanding the whiteness which silk acquires by these different operations, it must be carried to a higher degree of splendour by exposing it to the action of sulphurous acid gas, in a close chamber, or by immersing it in sulphurous acid, as before recommended for wool.

To bleach prints and printed books.

Simple immersion in oxygenated muriatic acid, letting the article remain in it a longer or shorter space of time, according to the strength of the liqnor, will be sufficient to whiten an engraving: if it is required to whiten a paper of a bound book, as it is necessary that all the leaves should be moistened by the acid, care must be taken to open the book well, and to make the boards rest on the edge of the vessel, in such a manner that the paper alone shall be dipped in the liquid; the leaves must be separated from each other, in order that they may be equally moistened on both sides.

To wash chintz.

Take two pounds of rice, boil it in two gallons of water till soft; then pour the whole into a tub; let it stand till about the warmth in general used for coloured linens; then put the chintz in, and use the rice instead of soap, wash it in this, till the dirt appears to be out, then boil the same quantity as above, but strain the rice from the water, and mix it in warm clear water. Wash in this till quite clean; afterwards rinse it in the water which the rice has been boiled in, and this will answer the end of starch, and no dew will affect it. If a gown, it must be taken to pieces, and when dried be careful to hang it as smooth as possible;—after it is dry, rub it with a sleek stone, but use no iron.

To wash fine lace or linen.

Take a gallon of furz blossoms and burn them to ashes, then boil them in six quarts of soft water; this, when fine, use in washing with the suds, as occasion requires, and the linen, &c. will not only be exceedingly white, but it is done with half the soap, and little trouble.

To clean black and white sarcenets.

Lay these smooth and even upon a board, spread a little soap over the dirty places; then make a lather with Castille soap, and with a common brush, dip it in, pass it over the long way, and repeat in this manner, till one side is sufficiently scoured; use the other in the same manner; then put it into hot water, and there let it lie, till you have prepared some cold water, wherein a small quantity of gum arabic has been dissolved. Now, rinse them well, take them out and fold them, pressing out the water with the hands on the board, and keeping them under the hands till they are dry: at which time, have brimstone ready to dry them over, till they are ready for smoothing, which must be done on the right side, with a moderate hot iron.

To wash and stain tiffanies.

Let the hems of the tiffanies be at first only a little soaped, then having a lather of soap, put them into it hot, and wash them very gently for fear they should be crumpled: and when they are clean, rinse them in warm water, in which a little gum arabic has been dissolved, keeping them from the air as much as possible; then add a lump of starch, wet the tiffanies with a soft linen rag, and fold them up in a clean cloth, pressing them till they are near dry; after which put them near the fire, and finish the drying over brimstone; then shape them properly by gently ironing them.

To wash and starch lawns.

Lawns may be done in the same manner as the former, only observe to iron them on the wrong side, and use gum arabic water instead of starch, and, according to what has been directed for sarcenets, any coloured silks may be starched, abating or augmenting the gum water, as may be thought fit, according to the stiffness intended.

To clean buff coloured cloth.

Take tobacco-pipe clay, and mix it with water till it is as thick as lime-water used for white-washing rooms; spred this over the cloth, and when it is dry, rub it off with a brush, and the cloth will look extremely well.

To make saponaceous ley for washing.

Boil together in a sufficient quantity of water, a gallon of good wood-ashes, and two or three handsful of fresh burnt-lime. Leave the lixivium at rest, till the extraneous matters have been deposited at the bottom, or thrown to the surface to be skimmed off. Then draw off the pure lixivium, add to it oil, to about a thirtieth or fortieth part of its own quantity. The mixture will be a liquor white as milk, capable of frothing like soap-water, and in dilution with water, perfectly fit to communicate sufficient whiteness to linen. This liquor may be prepared from wood-ashes of all sorts, and from rancid grease, oil, or butter. It is therefore highly worthy the attention of the economist. When the ashes are suspected to be unusually deficient in alkali, a small addition of pulverized potash or soda may be made to the lixivium.

To clean and starch point lace.

Fix the lace in a prepared tent, draw it straight, make a warm lather of Castille soap, and, with a fine brush dipped in, rub over the point gently; and when it is clean on one side, do the same to the other; then throw some clean water on it, in which a little alum has been dissolved, to take off the suds, and having some thin starch, go over with the same on the wrong side, and iron it on the same side when dry, then open it with a bodkin, and set it in order.

To clean point lace, if not very dirty, without washing; fix it in a tent as the former, and go over with fine bread, the crust being pared off, and when it is done, dust out the crumbs, &c.

To clean white veils.

Put the veil in a solution of white soap, and let it simmer a quarter of an hour. Squeeze it in some warm water and soap, till quite clean. Rinse it from soap, and then in clean cold water, in which is a drop of liquid blue. Then pour boiling water upon a tea-spoonful of starch, run the veil through this, and clear it well, by clapping it. Afterwards pin it out, keeping the edges straight and even.

To clean black veils.

Pass them through a warm liquor of bullock's gall and water; rinse in cold water: then take a small piece of glue, pour boiling water on it, and pass the veil through it, clap it, and frame it to dry.

To clean white satin and flowered silks.

Mix sifted stale bread crumbs with powder blue, and rub it thoroughly all over, then shake it well, and dust it with clean soft cloths. Afterwards, where there are any gold or silver flowers, take a piece of crimson in grain velvet, rub the flowers with it, which will restore them to their original lustre.

Another method.

Pass them through a solution of fine hard soap, at a hand heat, drawing them through the hand. Rinse in luke-warm water, dry and finish by pining out. Brush the flossy or bright side with a clean clothes' brush, the way of the nap. Finish them by dipping a sponge into a size, made by boiling isinglass in water, and rub the wrong side. Rinse out a second time, and brush and dry near a fire, or in a warm room.

Silks may be treated in the same way, but not brushed. If the silks are for dyeing, instead of passing them through a solution of soap and water, they must be boiled off; but if the silks are very stout, the water, must only be of heat, sufficient to extract the dirt, and when rinsed in warm water, they are in a state for the dye.

Another method.

Strew French chalk over them, and brush it off with a hard brush once or twice.

To clean coloured silks of all kinds.

Put some soft soap into boiling water, and beat it till dissolved in a strong lather. At a hand heat put in the article. If strong, it may be rubbed as in washing; rinse it quickly in warm water, and add oil of vitriol, sufficient to give another water a sourish taste, if for bright yellows, crimsons, maroons, and scarlets; but for oranges, fawns, browns, or their shades use no acid. For bright scarlet, use a solution of tin. Gently squeeze and then roll it in a coarse sheet, and wring it. Hang it in a warm room to dry, and finish it by calendering or mangling.

For pinks, rose colours, and thin shades, &c. instead of oil of vitriol, or solution of tin, prefer lemon juice, or white tartar, or vinegar.

For blues, purples, and their shades, add a small quantity of American pearl-ash; it will restore the colours. Wash the articles like a linen garment, but, instead of wringing, gently squeeze and sheet them, and when dry, finish them with fine gum water, or dissolved isinglass, to which add some pearl-ash, rubbed on the wrong side; then pin them out.

Blues of all shades are dyed with archil, and afterwards dipped in a vat; twice cleaning with pearl-ash, restores the colour. For olive greens, a small quantity of verdigris dissolved in water, or a solution of copper, mixed with the water, will revive the colour again.

To clean black silks.

To bullock's gall, add boiling water sufficient to make it warm, and with a clean sponge, rub the silk well on both sides, squeeze it well out, and proceed again in like manner. Rinse it in spring water, and change the water till perfectly clean, dry it in the air, and pin it out on a table; but first dip the sponge in glue-water, and rub it on the wrong side; then dry it before a fire.

To dip rusty black silks.

If it requires to be red dyed, boil log-wood; and in half an hour, put in the silks, and let it simmer half an hour. Take it out, and dissolve a little blue vitriol and green copperas, cool the copper, let it simmer half an hour, then dry it over a stick in the air. If not red dyed, pin it out, and rinse it in spring water, in which half a tea-spoonful of oil of vitriol has been put. Work it about five minutes, rinse it in cold water, and finish it by pinning and rubbing it with gum water.

To clean silk stockings.

Wash with soap and water; and simmer them in the same for ten minutes, rinsing in cold water. For a blue cast, put one drop of liquid blue, into a pan of cold spring water, run the stockings through this a minute or two, and dry them. For a pink cast, put one or two drops of saturated pink dye into cold water, and rinse them through this. For a flesh-colour, add a little rose pink in a thin soap-liquor, rub them with clean flannel, and calender or mangle them.

To extract grease spots from silks and coloured muslins, &c.

Scrape French chalk, put it on the grease-spot, and hold it near the fire, or over a warm iron, or water-plate, filled with boiling water. The grease will melt, and the French chalk absorb it, brush or rub it off. Repeat if necessary.

To take stains out of silk.

Mix together in a phial, 2 oz. of essence of lemon, 1 oz. of oil of turpentine.

Grease and other spots in silks, are to be rubbed gently with a linen rag dipped in the above composition.

To take spots of paints from cloth, silks, &c.

Dip a pen in spirit of turpentine, and transfer it to the paint spot, in sufficient quantity to discharge the oil and gluten. Let it stand some hours, then rub it.

For large or numerous spots, apply the spirit of turpentine with a sponge, if possible before it is become dry.

To scour yarn.

It should be laid in lukewarm water for three or four days, each day shifting it once, wringing it out, and laying it in another water of the same nature; then carrying it to a well or brook, and rinse it till nothing comes from it but pure clean water: that done, take a bucking-tub, and cover the bottom with very fine aspen ashes; and then having opened and spread the slippings, lay them on those ashes, and put more ashes above, and lay in more slippings, covering them with ashes as before; then lay one upon another till the yarn is put in; afterwards cover up the uppermost yarn with a bucking-cloth, and, in proportion to the size of the tub, lay in a peck or two more of ashes; this done, pour upon the uppermost cloth, a great deal of warm water till the tub can receive no more, and let it stand so all night. Next morning set a kettle of clean water on the fire; and when it is warm, pull out the spiggot of the bucking-tub, to let the water run out of it into another clean vessel; as the bucking-tub wastes, fill it up again with warm water on the fire; and as the water on the fire wastes, so likewise fill up that with the ley that comes from the bucking-tub, ever observing to make the ley hotter and hotter, till it boils: then you must, as before, ply it with the boiling ley at least four hours together. For whitening, you must take off this bucking-cloth; then putting the yarn with the ley ashes into large tubs, with your hands labour the yarn, ashes, and ley, pretty well together, afterwards carry it to a well or river, and rinse it clean; then hang it upon poles in the air all day, and in the evening take the slippings down, and lay them in water all night; the next day hang them up again, and throw water on them as they dry, observing to turn that side outermost, which whitens slowest. After having done this for a week together, put all the yarn again into a bucking-tub, without ashes, covering it as before with a bucking-cloth; lay thereon good store of fresh ashes, and drive that buck, as before, with very strong boiling ley, for half a day, or more; then take it out, and rinse it, hanging it up, as before, in the day time, to dry, and laying it in water at night, another week. Lastly, wash it over in fair water, and dry it.

To scour thick cotton counterpanes.

Cut a pound of mottled soap into thin slices; and put it into a pan with a quarter of an ounce of pot-ash, and an ounce of pearl-ash. Pour a pail of boiling water on it, and let it stand till dissolved. Then pour hot and cold water into a scouring tub, with a bowl of the solution. Put in the counterpane, beat it well, turn it often, and give it a second liquor as before, then rinse it in cold water. Now put three tea-spoonsful of liquid blue into a thin liquor; stir it, and put in the counterpane: beat it about five minutes, and dry it in the air.

To scour undyed woollens.

Cut 1-2 a pound of the best yellow soap into thin slices, and pour such a quantity of boiling river water on it as will dissolve the soap, and make it of the consistence of oil. Cover the articles about two inches with water, such as the hand can bear, and add a lump of American pearl-ash, and about a third of the soap solution. Beat them till no head of lather rises on the water; throw away the dirty water, and proceed as before with hotter water without pearl-ash.

To scour clothes, coats, pelisses, &c.

If a black, blue, or brown coat, dry, 2 ounces of fuller's earth, and pour on it sufficient boiling water to dissolve it, and plaister with it the spots of grease; take a pennyworth of bullock's gall, mix with it half a pint of stale urine; and a little boiling water; with a hard brush dipped in this liquor, brush the spotted places. Then dip the coat in a bucket of cold spring water. When nearly dry, lay the nap right, and pass a drop of oil of olives over the brush to finish it.

If grey, drab, fawns, or maroons, cut yellow soap into thin slices, and pour water upon it to moisten it. Rub the greasy and dirty spots of the coat. Let it dry a little, and then brush it with warm water, repeating, if necessary, as at first, and use water a little hotter; rinse several times, in warm water, and finish as before.

To scour carpets, hearth-rugs, &c.

Rub a piece of soap on every spot of grease or dirt; then take a hard brush dipped in boiling water, and rub the spots well. If very dirty, a solution of soap, must be put into a tub, with hot water, and the carpet well beat in it, rinsing it in several clean waters, putting in the last water a table spoonful of oil of vitriol, to brighten the colours.

To clean cotton gowns.

Make a solution of soap, put in the articles, and wash them in the usual way. If greens, reds, &c. run, add lemon juice, vinegar, or oil of vitriol, to the rinsing water.

To clean scarlet cloth.

Dissolve the best white soap; and if black-looking spots appear, rub dry soap on them; while the other soap is dissolving; with hot water, brush it off. If very dirty, immerse the article into the warm solution, and rub the stained parts. Despatch it quickly, and as soon as the colour begins to give, wring it out, and immerse it in a pan or pail of warm water; wring it again, and immerse it in cold spring water, in which mix a table-spoonful of solution of tin. Stir it about, and in ten minutes, hang it to dry in the shade, and cold press it.

Another method.

On a quarter of a peck of wheaten bran, pour boiling water in a hair sieve. In the bran-water at a hand heat, immerse the cloth, and rub it, looking through it to see the spots. To a second liquor, add nearly a quarter of an ounce of white or crude tartar. If darkened, make a clean liquor of cold spring water with a drop or two of solution of tin, soak it ten minutes, wring it, and hang it up to dry.

To dip scarlet cloth.

After it has been thoroughly cleaned with soap, and rinsed in warm water, put into boiling spring water, a quarter of a pound of young fustic, or zant, a drachm of pounded and sifted cochineal, and an equal quantity of cream of tartar and cochineal; boil five or six minutes, and cool by adding a pint or two of cold spring water, and a table spoonful of the solution of tin. Stir the mixture, put in the cloth, boil for ten minutes, and when dry, cold press it.

To raise the nap on cloth.

Soak in cold water for half an hour, then put on a board, and rub the thread-bare parts with a half-worn hatter's card, filled with flocks, or with a prickly thistle, until a nap is raised. Hang up to dry, and with a hard brush lay the nap the right way.

To revive faded black cloth.

Having cleaned it well, boil two or three ounces, of logwood for half an hour. Dip it in warm water and squeeze it dry, then put it into the copper, and boil half an hour. Take it out and add a small piece of green copperas, and boil it another half hour. Hang it in the air for an hour or two, then rinse it in two or three cold waters, dry it and let it be regularly brushed with a soft brush, over which a drop or two of oil of olives has been rubbed.

To dry clean cloth.

Dip a brush in warm gall, and apply it to greasy places, rinse it off in cold water; dry by the fire, then lay the coat flat, strew damp sand over it, and with a brush beat the sand into the cloth; then brush it out with a hard brush, and the sand will bring away the dirt. Rub a drop of oil of olives over a soft brush, to brighten the colours.

To bleach wool, silks, straw bonnets, &c.

Put a chafing dish with some lighted charcoal into a close room, or large box; then strew an ounce or two of powdered brimstone on the hot coals. Hang the articles in the room or box, make the door fast, and let them hang some hours. Fine coloured woollens are thus sulphured before dyed, and straw bonnets are thus bleached.

To take iron-moulds out of linen.

Hold the iron mould on the cover of a tankard of boiling water, and rub on the spot a little juice of sorrel and salt, and when the cloth has thoroughly imbibed the juice, wash it in ley.

To make breeches-ball.

Mix 1 pound of Bath brick, 2 pounds of pipe clay, 4 ounces of pumice stone powder, and 6 ounces of ox gall; colour them with rose pink, yellow ochre, umber, Irish slate, &c. to any desired shade.

Clothes' ball.

Mix 2 pounds of pipe clays, 4 ounces of fuller's earth, 4 ounces of whiting, and a quarter of a pint of ox galls.

To take grease out of leather breeches.

The white of an egg applied to the injured part, and dried in the sun, will effectually answer this purpose.

Another method.

To two table spoonsful of spirits of turpentine, put half an ounce of mealy potatoes, add some of the best Durham mustard, with a little vinegar; let them dry, and when well rubbed, the spots will be entirely removed.

To prepare a chemical liquid for cleaning boot-tops, &c.

Mix in a phial, one drachm of oxymuriate of potass, with two ounces of distilled water; and when the salt is dissolved, add two ounces of muriatic acid. Then shake well together, mix in another phial, three ounces of rectified spirit of wine with half an ounce of the essential oil of lemon, unite the contents of the two phials, and keep the liquid, thus prepared, closely corked for use. This chemical liquid should be applied with a clean sponge, and dried in a gentle heat; after which, the boot-tops may be polished with a proper brush, so as to appear like new leather.

Another method of cleaning boot-tops.

Take of white vitriol, powdered, 1 oz. acid of sugar, 1 oz. water, 1 quart. Mix together. Put a label on it, "Rank Poison."

Sponge the tops with water first; then mix with the liquid, and then with water again.

To cleanse feathers from animal oil.

Mix well with a gallon of clear water, a pound of quick lime; and, when the lime is precipitated in fine powder, pour off the clear lime-water for use, at the time it is wanted. Put the feathers to be cleaned in a tub, and add to them a sufficient quantity of the clear lime-water, so as to cover them about three inches. The feathers, when thoroughly moistened, will sink down, and should remain in the lime-water for three or four days; after which, the foul liquor should be separated from them by laying them on a sieve. Afterwards, well wash them in clean water, and dry them on nets, about the same fineness as cabbage nets. Shake them from time to time, on the nets; as they dry, they will fall through the mashes, when collect them for use. The admission of air will be serviceable in the drying, and the whole process may be completed in about three weeks. The feathers, thus prepared, want nothing further than beating, to be used either for beds, bolsters, pillows, &c.

To clean leather.

Take of French yellow ochre, 1 lb. sweet oil, a desart spoonful. Mix well together, so that the oil may not be seen: then take of pipe clay 1 lb. starch, a quarter of a lb. Mix with boiling water, when cold, lay it on the leather. When dry, rub and brush it well.

To make scouring balls.

Portable balls for removing spots from clothes, may be thus prepared. Fuller's earth perfectly dried, (so that it crumbles into a powder,) is to be moistened with the clear juice of lemons, and a small quantity of pure pearlashes is to be added. Knead the whole carefully together, till it acquires the consistence of a thick elastic paste: form it into convenient small balls, and dry them in the sun. To be used, first moisten the spot on the cloths with water, then rub it with the ball, and let the spot dry in the sun; after having washed it with pure water, the spot will entirely disappear.

To clean marble.

Take verdigris and pumice-stone, well powdered, with lime newly slaked. Mix with soap lees, to the consistence of putty. Put it in a woollen rag, and rub the stains well one way. Wash off with soap and water. Repeat, if not removed.

To take stains out of silver plate.

Steep the plate in soap leys for the space of four hours; then cover it over with whiting, wet with vinegar, so that it may stick thick upon it, and dry it by a fire; after which, rub off the whiting, and pass it over with dry bran, and the spots will not only disappear, but the plate will look exceedingly bright.

To make plate look like new.

Take of unslaked lime and alum, a pound each, of aqua-vitæ, and vinegar, each a pint, and of beer grounds, two quarts; boil the plate in these, and they will set a beautiful gloss upon it.

To take out fruit spots.

Let the spotted part of the cloth imbibe a little water without dipping, and hold the part over a lighted common brimstone match at a proper distance. The sulphurous gas which is discharged, soon causes the spots to disappear.

To clean gold lace and embroidery.

For this purpose no alkaline liquors are to be used; for while they clean the gold they corrode the silk, and change or discharge its colour. Soap also alters the shade, and even the species of certain colours. But spirit of wine may be used without any danger of its injuring either colour or quality; and in many cases, proves as effectual for restoring the lustre of the gold, as the corrosive detergents. But, though spirit of wine is the most innocent material employed for this purpose, it is not in all cases proper. The golden covering may be in some parts worn off; or the base metal, with which it has been alloyed, may be corroded by the air, so as to leave the particles of the gold disunited; while the silver underneath, tarnished to a yellow hue, may continue a tolerable colour to the whole; so it is apparent that the removal of the tarnish would be prejudicial, and make the lace or embroidery less like gold than it was before.

To remove spots of grease from cloth.

Spots of grease may be removed by a diluted solution of potash, but this must be cautiously applied, to prevent injury to the cloth. Stains of white wax, which sometimes fall upon the clothes from wax candles, are removed by spirits of turpentine, or sulphuric ether. The marks of white paint may also be discharged by the above-mentioned agents.

To take mildew out of linen.

Rub it well with soap: then scrape some fine chalk, and rub that also in the linen, lay it on the grass; as it dries, wet it a little, and it will come out after twice doing.

To take out spots of ink.

As soon as the accident happens, wet the place with juice of sorrel or lemon, or with vinegar, and the best hard white soap.

To take out stains of cloth or silk.

Pound French chalk fine, mix with lavender-water to the thickness of mustard. Put on the stain; rub it soft with the finger or palm of the hand. Put a sheet of blotting and brown paper on the top, and smooth it with an iron milk-warm.

To remove grease spots from paper.

Let the paper stained with grease, wax, oil, or any other fat body, be gently warmed, taking out as much as possible of it, by blotting paper. Dip a small brush in the essential oil of well-rectified spirits of turpentine, heated almost to ebullition (for when cold it acts very weakly;) and draw it gently over both sides of the paper, which must be carefully kept warm. Let this operation be repeated as many times as the quantity of the fat-body, imbibed by the paper, or the thickness, of the paper, may render it necessary. When the greasy substance is removed, to restore the paper to its former whiteness, dip another brush in highly-rectified spirit of wine, and draw it in like manner over the place; and particularly around the edges, to remove the border that would still present a stain. If the process has been employed on a part, written on with common ink, or printed with printer's ink, it will experience no alteration.

Another method.

Take of roche-alum burnt, and flour of brimstone, an equal quantity of each; and reducing them to a fine powder, wet the paper a little, put a small quantity of the powder upon the place, and the spots will disappear.

Another.

Scrape finely, some pipe-clay, (the quantity will be easily determined on making the experiment,) on this lay the sheet or leaf, and cover the spot, in like manner, with the clay. Cover the whole with a sheet of paper, and apply, for a few seconds, a heated ironing box, or any substitute adopted by laundresses. On using Indian rubber, to remove the dust taken up by the grease, the paper will be found restored to its original whiteness and opacity. This simple method has often proved much more effectual than turpentine, and was remarkably so, in an instance, where the folio of a ledger had exhibited the marks of candle-grease and the snuff for more than twelve months.

To cleanse gloves without whetting.

Lay the gloves upon a clean board, make a mixture of dried fulling-earth and powdered alum, and pass them over on each side with a common stiff brush: then sweep it off, and sprinkle them well with dry bran and whiting, and dust them well; this, if they be not exceedingly greasy, will render them quite clean; but if they are much soiled take out the grease with crumbs of toasted bread, and powder of burnt bone: then pass them over with a woollen cloth dipped in fulling earth or alum powder: and in this manner they can be cleaned without wetting, which frequently shrinks and spoils them.

Fullers' purifier for woollen cloths.

Dry, pulverize, and sift the following ingredients:

6 lbs. of fullers' earth, 1 lb. of pipe-clay, and 4 oz. of French chalk.

Make a paste of the above with the following:—

1 oz. of rectified oil of turpentine, 2 oz. of spirit wine, and 1 1-2 lbs. of melted oil soap.

Make up the compound into six-penny or shilling cakes for sale. These cakes are to be kept in water, or in small wooden boxes.

To clean all sorts of metal.

Mix half a pint of refined neat's foot oil, and half a gill of spirits of turpentine. Scrape a little kernel or rotten stone; wet a woollen rag therewith, dip it into the scraped kernel, and rub the metal well. Wipe it off with a soft cloth, polish with dry leather, and use more of the kernel. In respect to steel, if it is very rusty, use a little powder of pumice with the liquid, on a separate woollen rag first.

To take stains out of mahogany.

Mix 6 ounces of spirit of salts, and half an ounce of rock salt of lemons (powdered) together. Drop a little on the stain, and rub it with a cork till it disappear. Wash off with cold water.

Another method.

Take 2 ounces of oil of vitriol, and 1 ounce of muriatic acid, or spirit of salts. Mix, by shaking in a phial, and when to be used lay it over the spotted part by means of a feather, or woollen rag. Afterwards wash the part over with water, and polish as usual.

To take out writing.

When recently written, ink may be completely removed by the oxymuriatic acid, (concentrated and in solution.) The paper is to be washed over repeatedly with the acid; but it will be necessary afterwards to wash it with lime-water, for the purpose of neutralizing any acid that may be left on the paper, and which would considerably weaken it. If the ink has been long written, it will have undergone such a change as to prevent the preceding process acting. It ought therefore to be washed with liver of sulphur (sulphuret of ammonia) before the oxymuriatic acid is applied. It may be washed with a hair pencil.

To restore whites in ancient pictures.

Carbonate of lead, exposed for some time to hydro-sulphuretted vapours, will become black, being converted to sulphuret. This colour, when used with oil, and covered with a varnish which defends it from the immediate contact of the air, may be preserved for several ages, as is proved by the paintings of the fifteenth century. But when nothing protects it from the sulphurous vapours floating in the atmosphere, as is the case in distemper colours, this substance should be avoided, if a permanent colour is intended.

Among the numerous properties which belong to the oxygenated water discovered by M. Thenard, one is, instantly to change the black of sulphuret of lead to white. A bottle of weakly oxygenated water, containing not more than 5 or 6 volumes of oxygen, and quite tasteless, being applied to the black spots with a few dips of the brush, they have disappeared as if by enchantment. The ground being coloured by a light tint of bistre, was not, in the slightest degree, altered, and the painting has been completely restored, without the addition of a single touch, to the original design.

To restore hangings, carpets, chairs, &c.

Beat the dust out of them as clean as possible, then rub them over with a dry brush, and make a good lather of Castille soap, and rub them well over with a hard brush, then take clean water, and with it wash off the froth, make a water with alum, and wash them over with it, and when dry, most of the colours will be restored in a short time; and those that are yet too faint, must be touched up with a pencil dipped in suitable colours: it may be run all over in the same manner with water colours mixed well with gum water, and it will look at a distance like new.

To clean paper hangings.

Cut into eight half quarters a stale quartern loaf; with one of these pieces, after having blown off all the dust from the paper to be cleaned by means of a good pair of bellows, begin at the top of the room, holding the crust in the hand, and wiping lightly downward with the crumb, about half a yard at each stroke, till the upper part of the hangings is completely cleaned all round; then go again round with the like sweeping stroke downward, always commencing each successive course a little higher than the upper stroke had extended till the bottom be finished. This operation, if carefully performed, will frequently make very old paper look almost equal to new. Great caution must be used not by any means to rub the paper hard, nor to attempt cleaning it the cross or horizontal way. The dirty part of the bread must be each time cut away, and the pieces renewed as soon as at all necessary.

CEMENTS.

To make an improved building cement.

This method consists in the employment of certain burnt or vitrified earths, and metallic and other substances, which are pounded or ground to powder, and mixed with lime.

The earthy substances used, are all those kinds of clay or loam that are capable of becoming vitrified and intensely hard, by exposure to a strong fire; chalk, and such earths as become soft and fall to pieces, when exposed to heat, are unfit for the purpose: but flint stones and pebbles, may be used with advantage.

The proper kinds of earth being thus selected, the material is heated in the interior of a brick-kiln, or furnace, until it becomes completely vitrified or reduced to a state of hard, black, or glossy clay, and this vitrification will sometimes be improved, by mixing refuse, or broken glass, or sand and wood-ashes, with sand or vitrified materials, such as those which come from the furnaces of smelting-houses, glass-houses, foundries, &c. or any materials reduced to a state of vitrification by intense heat. These materials are then to be bruised, pounded, or ground, and sifted through a wire sieve, until reduced to such a state of fineness as may be proper for mixing up as a plaister. Thus prepared, the materials are to be sorted into different qualities, and put up for use.

Manner of using it.

The manner of using this material, is by mixing it with well-burnt lime instead of the sand usually employed in the composition of stucco or cement, to which water must be added, until a proper consistency is obtained. This artificial Puzzolene may be mixed with quick lime, completely pulverized, and put into casks for use; it is, however, necessary to keep it from moisture, or exposure to the open air. The proportion of quick lime to be added to the above materials, depends entirely upon the strength of the lime: in general, one measure of good lime will be sufficient for from three to five measures of the material.

Another part of the improvement, consists in the introduction of various coloured bricks, which, highly burnt or vitrified, and reduced to powder, are to be mixed up with the artificial Puzzolene, in order to produce spots or streaks, in imitation of marble and other varegated stone.

To make Hamelin's cement.

This cement consists in a mixture of earths and other substances that are insoluble in water, or nearly so, either in their natural state, or such as have been manufactured, as earthen-ware, porcelain and such like substances; but Mr. H. prefers those earths that, either in their natural or manufactured state are the least soluble in water, and have, when pulverized or reduced to powder, the least colour. To the earth or earths, as before named, either in their natural or manufactured state, and so pulverized, he adds a quantity of each of the oxyds of lead, as litharge, grey oxyde, and minium, reduced or ground to a fine powder, and to the whole of the above-named substances, a quantity of pulverized glass or flint-stone. These various earths, oxyds, and glass or flint-stone, reduced to a pulverized state, in proper and due proportion, and being mixed with a proper and due proportion of vegetable oil, form and make a composition or cement, which, by contract or exposure to the atmosphere, hardens and forms an impenetrable and impervious coating or covering, resembling Portland or other stones.

To any given weight of the earth or earths, commonly called pit-sand, river-sand, rock-sand, or any other sand of the same or the like nature, or pulverized earthen-ware, or porcelain, add two-thirds of such given weight of the earth or earths, commonly called Portland-stone, Bath-stone, or any other stone, of the same or the like nature pulverized. To every five hundred and sixty pounds weight of these earths, so prepared, add forty pounds weight of litharge, and, with the last mentioned given weights, combine two pounds weight of pulverized glass or flint-stone. Then join to this mixture one pound weight of minium and two pounds weight of grey oxyd of lead.

This composition being thus mixed, pass the same through a wire sieve, or dressing machine, of such a fineness or mash as may be requisite for the purpose it is intended for, preferring a fine sieve, mash, or wire-work, when the composition is to be used for works that require a fine smooth or even surface.

It is now a fine and dry powder, and may be kept open in bulk or in casks for any length of time, without deterioration.

When this composition is intended to be made into cement, for any of the purposes described, it is spread upon a board or platform, or mixed in a trough: and to every six hundred and five pounds weight of the composition, are added five gallons of vegetable oil, as linseed-oil walnut-oil, or pink-oil. The composition is then mixed in a similar way to that of mortar, and is afterwards subjected to a gentle pressure, by treading upon it: and this operation is continued until it acquires the appearance of moistened sand. The mixture, being thus composed, is a cement fit and applicable to the enumerated purposes. It is requisite to observe, that this cement should be used the same day the oil is added, otherwise it will fix or set into a solid substance.

To apply to buildings.

When the cement is applied for the purpose of covering buildings intended to resemble stone, the surface of the building is washed with oil. The cement is then applied of the thickness of an inch, or any greater thickness, according to the nature of the work, joint, or stone, it is intended to resemble. It is requisite to observe, that when a joint, intended to resemble a plain stone joint, is to be made upon the surface of the cement or composition, the cement must be partly set or hardened previously to the impression of the joint upon its surface, and the joint is made by a rule and steel jointer. When the cement is used for the covering of substances less absorbent than bricks or tiles, (as wood, lead, iron, or tin,) a much less quantity of boiled linseed oil in preparing the surfaces is required.

To make cement for floors.

Earthen-floors are commonly made of loam, and sometimes, especially to make malt on, of lime and brook-sand, and gun-dust or anvil dust from the forge. The manner of making earthen-floors for plain country habitations is as follows: Take two-thirds of lime, and one of coal-ashes well sifted, with a small quantity of loam clay; mix the whole together, and temper it well with water, making it up into a heap; let it lie a week or ten days, and then temper it over again. After this, heap it up for three or four days, and repeat the tempering very high, till it becomes smooth, yielding, tough, and gluey. The ground being then levelled, lay the floor therewith about 2 1-2 or three inches thick, making it smooth with a trowel: the hotter the season is, the better, and when it is thoroughly dried, it will make the best floor for houses, especially malt-houses. If any one would have their floors look better, let them take lime of rag-stones, well tempered with white of eggs, covering the floor about half an inch thick with it, before the under flooring is too dry. If this be well done, and thoroughly dried, it will look, when rubbed with a little oil, as transparent as metal or glass. In elegant houses, floors of this nature, are made of stucco, or of plaister of Paris beaten and sifted, and mixed with other ingredients.

To make cement for canals.

Take one part of iron filings, reduced to sifted powder, 3 parts of silica, 4 parts of alumine combined with oxide of iron—the same quantity of pulverized brick, and two parts of hot lime; the whole measured by weight and not by bulk.

Put the mixture into a large wooden tub, in order that nothing foreign may be introduced into it. If sufficient water is poured out to extinguish the lime and give a degree of liquidness to the cement, and if all the component parts are briskly stirred, a great degree of heat will be emitted from the lime, and an intimate union formed by the heat.

To make Parker's cement.

This cement is made of very argillaceous lime-stones, which are burnt in conical kilns, with a continued fire of pit-coal, in the same manner as other lime-stones; but if the heat be so great as to cause a commencement of fusion in the cement, it will be totally spoiled. It is reduced to an impalpable powder by grinding as soon as it is burnt, and is sent away in barrels well closed.

The above is much used in London for facing houses, and for the foundation of large edifices. It requires much practice in the workmen who use it; for if not tempered to the proper consistence, and immediately applied, it solidifies unequally, cracks, and adheres badly. It is recommended to be mixed with fine angular sand well washed, in the proportion of two parts to three of cement, for foundations and cornices exposed to rain; from 3, 4, and 5 parts to 3 of cement for common mortars; from three parts to two of cement for coating walls exposed to cold, and five parts to two of cement for walls exposed to dryness or heat.

Cement for rock-work and reservoirs.

Where a great quantity of cement is wanted for coarse uses, the coal-ash mortar (or Welsh tarras) is the cheapest and best, and will hold extremely well, not only where it is constantly kept wet or dry, but even where it is sometimes dry and at others wet; but where it is liable to be exposed to wet and frost, this cement should, at its being laid on, be suffered to dry thoroughly before any moisture has access to it; and in that case, it will likewise be a great improvement to temper it with the blood of any beast.

The mortar must be formed of one part lime and two parts of well-sifted coal-ashes, and they must be thoroughly mixed by being beaten together; for on the perfect commixture of the ingredients the goodness of the composition depends.

To make mortar.

Mortar is composed of quick-lime and sand, reduced to a paste with water. The lime ought to be pure, completely free from carbonic acid, and in the state of a very fine powder; the sand should be free from clay, partly in the state of fine sand, and partly in that of gravel; the water should be pure; and if previously saturated with lime, so much the better. The best proportions are three parts of fine, and four parts of coarse sand, one part of quick lime, recently slaked, and as little water as possible.

The addition of burnt bones improve mortar by giving it tenacity, and render it less apt to crack in drying; but they ought never to exceed one-fourth of the lime employed.

When a little manganese is added to mortar, it acquires the important property of hardening under water; so that it may be employed in constructing those edifices which are constantly exposed to the action of water. Limestone is often combined with manganese: in that case it becomes brown by calcination.

Tunisian cement.

This is composed of three parts of lime, one of sand, and two of wood-ashes: these ingredients are mixed up with oil, and water alternately, till they compose a paste of the desired consistency.

Dutch terras.

This is composed of basalt ground to a fine powder, and blue argillaceous lime, mixed up with water, and well beaten together.

Tournay cement.

Is a mixture of coal ashes, with blue argilloferruginous lime and sand, well beaten up with water, left to dry, repeatedly levigated, moistened, and beaten.

Roman cement.

A sort of plaister so called, which well withstands our soft climate, is made by mixing a bushel of lime slaked, with 3 pounds and a half of green copperas, 15 gallons of water, and half a bushel of fine gravel sand. The copperas should be dissolved in hot water; it must be stirred with a stick, and kept stirring continually while in use. Care should be taken to mix at once as much as may be requisite for one entire front, as it is very difficult to match the colour again; and it ought to be mixed the same day it is used.

Genuine Roman cement.

This consists of the *pulvis Buteolanus*, or *Puzzolene*, a ferruginous clay from Puteoli, calcined by the fires of Vesuvius, lime, and sand, mixed up with soft water. The only preparation which the Puzzolene undergoes is that of pounding and sifting; but the ingredients are occasionally mixed up with bullock's blood, and fat of animals, to give the composition more tenacity.

Maltha, or Greek Mastich.

This is a more simple composition than the cement of the Romans, when used for stucco on the outsides of fabrics, consisting only of lime and sand, but rendered into a paste with milk, or *size*.

Indian cement.

This is only a variation of the mastich, and is composed of equal quantities of flint, lime, and pit sand, slaked with water, well beaten, and suffered to remain for three or four days, then moistened and mixed up with oil, mucilage, whites of eggs, and butter-milk, and applied, as rapidly as possible, after being mixed.

To make impenetrable mortar.

Mix thoroughly one-fourth of the fresh unslaked lime with three-fourths of sand; and let five labourers make mortar of these ingredients, by pouring on water, with trowels, to supply one mason, who must, when the materials are sufficiently mixed, apply it instantly as cement or plaister, and it will become as hard as stone. The lime used should be stone-lime; previous to its use, it should be preserved from the access of air or wet, and the plaister screened for some time from the sun and wind.

To make Wych's stucco.

Take four or five bushels of such plaister as is commonly burnt for floors about Nottingham (or a similar quantity of any tarras, plaister, or calcined gypsum:) beat it to fine powder, then sift and put it into a trough, and mix with it 1 bushel of pure coal ashes, well calcined. Pour on the water, till the whole becomes good mortar. Lay this in wooden frames of twelve feet in length on the walls, well smoothed with common mortar and dry, the thickness of two inches at each side, and three inches in the middle. When the frame is moved to proceed with the work, leave an interval of two inches for this coping to extend itself, so as to meet the last frame work.

To make Williams' stucco.

Take sharp, rough, large-grained sand, sifted, washed, dried, and freed from all impurities, 84 pounds; well burnt lime, slaked and finely sifted, 12 pounds; curd, or cheese, produced from milk, 4 pounds; (the first, fresh made, and strongly pressed, to divest it of its whey; the second, whilst perfectly sound, rasped into powder with a grater, or brought into a very light substance with scrapers, or fine-toothed plane-irons, in a turner's lathe;) and lastly, water in its natural state, 10 pounds. If the sand is not thoroughly dried, or the lime has got damp from the air, the quantity of water must be less than the above proportion; and, on the contrary, when the lime is used immediately, it may require more; so that the proper stiffness of the mortar, under those circumstances, will regulate the making of the composition.

Iron cement.

This is formed of the borings of cast iron guns or turnings of cast iron which should be clean and free from rust until used. By slight pounding or triturating they are broken but not powdered, and then coarsely sifted. At the time of using, they are to be mixed with powdered sal ammoniac and sulphur, and slightly moistened with water; when the composition must be rammed or caulked into the joints with a blunt caulking chisel and hammer, and the joint screwed up by its bolts as tightly as possible.

No more of this cement must be made than can be used at one time, because it soon spoils; but if good, it will become as hard as the iron itself in a few days, 2 ounces of sal ammoniac, and 1 ounce of sulphur is sufficient for 5 pounds of iron borings.

Water cement.

A cement may be made with common lime, that will harden *under water*. What is called *poor* lime has this peculiar property; but as this species of limestone rarely occurs, it is often an expensive article. The following is a good substitute, and may be used for water cisterns, aqueducts, &c. Mix four parts of grey clay, six of the black oxide of manganese, and ninety of good limestone reduced to fine powder; then calcine the whole to expel the carbonic acid. When this mixture has been well calcined and cooled, it is to be worked into the consistence of a soft paste with sixty parts of washed sand. If a lump of this cement be thrown into water, it will harden immediately. Such mortar, however, may be procured at a still less expense, by mixing with common quick lime a certain quantity of what are called the *white* iron ores, especially such as are poor in iron. These ores are chiefly composed of manganese and carbonate of lime, or chalk. Common lime and sand only, whatever may be the proportion of the mixture, will certainly become soft under water.

Water cement or stucco.

Take 56 pounds of pure coarse sand, 42 pounds of pure fine sand; mix them together, and moisten them thoroughly with lime water; to the wetted sand, add 14 pounds of pure fresh burnt lime; and while beating them up together, add in successive portions, 14 pounds of bone ash: the quicker and more perfectly these materials are beaten together, and the sooner they are used the better will be the cement; for some kinds of work it will be better to use fine sand alone, and for others, coarse sand; remembering the finer the sand is, the greater quantity of lime is to be employed.

To make a fire and water-proof cement.

To half a pint of vinegar, add the same quantity of milk; separate the card, and mix the whey with the whites of 5 eggs; beat it well together, and sift into it a sufficient quantity of quick lime, to convert it to the consistency of a thick paste. Broken vessels, mended with this cement, never afterwards separate, for it resists the action of both fire and water.

Turkish cement for joining metals, glass, &c.

Dissolve mastich in as much spirit of wine as will suffice to render it liquid; in another vessel dissolve as much isinglass (which has been previously soaked in water, till it is swollen and soft) in brandy, as will make 2 ounces by measure of strong glue, and add two small bits of gum galbanum, or ammoniacum, which must be rubbed or ground till they are dissolved; then mix the whole with a sufficient heat: keep it in a phial stopt, and when it is to be used set it in hot water.

Common cement for joining alabaster, marble, porphyry, and other stones.

Take of bees' wax, 2 pounds, and of resin, 1 pound. Melt them and add 1 pound and a half of the same kind of matter, powdered, as the body to be cemented is composed of, strewing it into the melted mixture, and stirring them well together, and afterwards kneading the mass in water, that the powder may be thoroughly incorporated with the wax and resin. The proportion of the powdered matter may be varied, where required, in order to bring the cement nearer to the colour of the body on which it is employed.

This cement must be heated when applied, as also the parts of the subject to be cemented together, and care must be taken, likewise, that they may be thoroughly dry.

To make lutes.

These are used for securing the juncture of vessels, in distillations and sublimations. For the distillation of water, linen dipped in a thin paste of flour and water is sufficient. A lute of greater security is composed of quick-lime, made into a paste with the white of eggs. For the security of very corrosive vapours, clay finely powdered and sifted, made into a paste with boiled linseed oil, must be applied to the juncture; which must be afterwards covered with slips of linen, dipped in the paste of quick-lime, and the whites of eggs. The lute must be perfectly dried before the vessels are used, or else the heat may cause it to dry too quick, and thereby cause the lute to crack. If this be the case, it is repaired by applying fresh lute in the cracks, and suffering it to dry gradually. Vessels which are to be exposed to the naked fire, are frequently coated to resist the effects of the heat, the best coating for which purpose, consists in dissolving 2 ounces of borax in a pint of boiling water; and adding to the solution as much slaked lime as is necessary to form a thin paste. The vessel must be covered all over with it by means of a painter's brush, and then suffered to dry. It must then be covered with a thin paste of linseed oil and slaked lime, except the neck. In two or three days it will dry of itself, and the retort will then bear the greatest fire without cracking. The cracks of chemical vessels may be secured by the second lute.

Cement for iron culinary utensils.

To 6 parts of yellow potter's clay, add 1 part of steel filings, and a sufficient quantity of oil. Make the paste of the consistence of glazier's putty.

To make turner's cement.

The following is a very excellent cement for the use of turners and artizans in general: 16 parts of whiting are to be finely powdered and heated to redness, to drive off all the water. When cold, it is to be mixed with 16 parts of black resin, and 1 part of bees'-wax, the latter having been previously melted together, and the whole stirred till of an uniform consistence.

Cement for joining broken glasses, &c.

Take two ounces of good glue, and steep it for a night in distilled vinegar; boil them together the next day, and having broken a clove of garlic with half an ounce of ox-gall, into a soft pulp, strain the juice through a linen cloth, using pressure, and add to it the glue and vinegar. Then take of sandarac powdered, and turpentine, each one drachm, and of sarcocol and mastic powdered, each half a drachm; put them into a bottle with an ounce of highly rectified spirit of wine. Stop the bottle, and let the mixture stand for three hours in a gentle heat, frequently shaking it. Mix this tincture also with the glue while hot, and stir them well together with a stick, till part of the mixture be evaporated, and then take the composition from the fire, and it will be fit for use. When this cement is to be applied it must be dipped in vinegar, and then melted in a proper vessel, with a gentle heat; and if stones are to be cemented, mix with it a little powdered chalk, or if glass is to be conjoined, powdered glass should be substituted.

A strong cement for electrical purposes.

Melt one pound of resin in a pot or pan, over a slow fire: add thereto as much plaister of Paris, in fine powder, as will make it hard enough, then add a spoonful of linseed oil, stirring it all the while, and try if it be hard and tough enough for the purpose; if it is not sufficiently hard, add more plaister of Paris; and if not tough enough, a little more linseed oil. This is as good a cement as possible for fixing the necks of globes or cylinders, or any thing else that requires to be strongly fixed; for it is not easily melted again when cold.

A cement for glass-grinders.

Take pitch and boil it; add thereto, and keep stirring it all the while, fine sifted wood ashes, until it is of a proper temper: a little tallow may be added, if found necessary. For small works, to four ounces of resin add one-fourth of an ounce of bees'-wax melted together; and four ounces of whitening, made previously red hot, The whitening should be put in while hot, that it may not have time to imbibe moisture from the atmosphere.

Another.

Shell-lac is a very strong cement for holding metals, glass, or precious stones, while cutting, turning, or grinding them. The metal, &c. should be warmed to melt it. For fastening ruby cylinders in watches, and similar delicate purposes, shell-lac is excellent.

To solder or cement broken glass.

Broken glass may be soldered or cemented in such a manner as to be as strong as ever, by interposing between the parts glass ground up like a pigment, but of easier fusion than the pieces to be joined, and then exposing them to such a heat as will fuse the cementing ingredient, and make the pieces agglutinate without being themselves fused. A glass for the purpose of cementing broken pieces of flint glass, may be made by fusing some of the same kind of glass previously reduced to powder, along with a little red lead and borax, or with the borax only.

Cement for Derbyshire spar and other stones.

A cement for this purpose may be made with about seven or eight parts of resin and one of bees'-wax, melted together with a small quantity of plaister of Paris. If it is wished to make the cement fill up the place of any small chips that may have been lost, the quantity of plaister must be increased a little. When the ingredients are well mixed, and the whole is nearly cold, the mass should be well kneaded together. The pieces of spar that are to be joined, must be heated until they will melt the cement, and then pressed together, some of the cement being previously interposed. Melted sulphur applied to fragments of stones previously heated (by placing them before a fire) to at least the melting point of sulphur, and then joined with the sulphur between, makes a pretty firm and durable joining. Little deficiencies in the stone, as chips out of corners, &c. may be also filled up with melted sulphur, in which some of the powder of the stone has been melted.

A cement that will stand against boiling water and the pressure of steam.

Boiled linseed oil, litharge, and red and white lead, mixed together to a proper consistence, and applied on each side of a piece of flannel previously shaped to fit the joint, and then interposed between the pieces before they are brought home (as the workmen term it) to their places by the screws or other fastenings employed, makes a close and durable joint. The quantities of the ingredients may be varied without inconvenience, only taking care not to make the mass too thin with oil. It is difficult in many cases instantly to make a good fitting of large pieces of iron-work, which renders it necessary sometimes to join and separate the pieces repeatedly, before a proper adjustment is obtained. When this is expected, the white lead ought to predominate in the mixture, as it dries much slower than the red.

This cement answers well also for joining broken stones, however large. Cisterns built of square stones put together with this cement, will never leak, or want any repairs. In this case the stones need not be entirely bedded in it: an inch, or even less, of the edges that are to lie next the water, need only be so treated; the rest of the joint may be filled with good lime.

Blood cement for coppersmiths.

A cement often used by coppersmiths to lay over the rivets and edges of the sheets of copper in large boilers, to serve as an additional security to the joinings, and to secure cocks, &c. from leaking, is made by mixing pounded quick-lime with ox's blood. It must be applied fresh made, as it soon gets hard. If the properties of this cement were duly investigated, it would probably be found useful for many purposes to which it has never yet been applied. It is extremely cheap, and very durable.

Japanese cement, or rice glue.

This elegant cement is made by mixing rice-flour intimately with cold water, and then gently boiling it: it is beautifully white, and dries almost transparent. Papers pasted together by means of this cement will sooner separate in their own substance than at the adjoining, which makes it useful in the preparation of curious paper articles, as tea-trays, ladies' dressing boxes, and other articles that require layers of paper to be cemented together.

BREWING.

To fit up a small brew house

PROVIDE a copper holding full two-thirds of the quantity proposed to be brewed, with a guage stick to determine the number of gallons in the copper. A mash tub, or tun, adapted to contain two-thirds of the quantity proposed to be brewed, and one or two tuns of equal size to ferment the wort. Three or four shallow coolers; one or two wooden bowls; a thermometer; half a dozen casks of different sizes; a large funnel; two or three clean pails, and a hand pump; the whole costing from ten to twenty pounds.

This proceeds on the supposition of two mashes for ale; but if only one mash is adapted for ale, with a view of making the table beer better, then the copper and mash tun should hold one-third more than the quantity to be brewed.

The expenses of brewing depend on the price of malt and hops, and on the proposed strength of the article. One quarter of good malt, and eight pounds of good hops, ought to make two barrels of good ale and one of table beer. The other expenses consist of coals and labour.

Of public breweries, and their extensive utensils and machinery, we affect to give no description, because books are not likely to be resorted to by the class of persons engaged in those extensive manufactories for information relative to their own particular business.

To choose water for brewing.

Soft water, or hard water softened by exposure to the air, is generally preferred, because it makes a stronger extract, and is more inclined to ferment; but hard water is better for keeping-beer, and is less liable to turn sour. Some persons soften hard water by throwing a spoonful of soda into a barrel, and others do it with a handful of common salt mixed with an ounce of salt of tartar.

To make malt.

Put about 6 quarters of good barley, newly threshed, &c. into a stone trough full of water, and let it steep till the water be of a bright reddish colour, which will be in about three days, more or less, according to the moisture or dryness, smallness or bigness of the grain, the season of the year, or the temperature of the weather. In summer malt never makes well; in winter it requires longer steeping than in spring or autumn. It may be known, when steeped enough, by other marks besides the colour of the water; as by the excessive swelling of the grain, if it be oversteeped, and by too much softness, being, when it is in a right temper, like the barley prepared to make broth. When sufficiently steeped, take it out of the trough, and lay it in heaps to let the water drain from it, then, after two or three hours, turn it over with a scoop, and lay it in a new heap, 20 or 24 inches deep. This is called the coming heap, in the right management of which lies the principal skill. In this heap it may lie 40 hours more or less, according the forementioned qualities of the grain, &c. before it come to the right temper of malt. While it lies, it must be carefully looked to after the first 15 or 16 hours; for about that time the grains begin to put forth roots; which, when they have equally and fully done, the malt must, within an hour after, be turned over with a scoop; otherwise the grains will begin to put forth the blade and spire also, which must by all means be prevented. If all the malt do not come equally, but that which lies in the middle, being warmest, come the soonest, the whole must be turned, so that what was outmost may be inmost; and thus it is managed till it be all alike. As soon as the malt is sufficiently come, turn it over, and spread it to a depth not exceeding 5 or 6 inches; and by the time it is all spread out, begin and turn it over again 3 or 4 times. Afterwards turn it over in like manner once in 4 or 5 hours, making the heap deeper by degrees; and continue to do so for the space of 48 hours at least. This cools, dries, and deadens the grain, so that it becomes mellow, melts easily in brewing, and separates entirely from the husk. Then throw up the malt into a heap as high as possible, where let it lie till it grow as hot as the hand can bear it, which usually happens in about the space of 30 hours. This perfects the sweetness and mellowness of the malt. After being sufficiently heated, throw it abroad to cool, and turn it over again about 6 or 8 hours after; and then lay it on a kiln with a hair cloth or wire spread under it. After one fire, which must last 24 hours, give it another more slow, and afterwards, if need be, a third; for if the malt be not thoroughly dried, it cannot be well ground, neither will it dissolve well in the brewing; but the ale it makes will be red, bitter, and unfit for keeping.

To grind malt.

To obtain the infusion of malt, it is necessary to break it, for which purpose it is passed through stones placed at such distance, as that they may crush each grain without reducing it to powder; for if ground too small, it makes the worts thick, while, if not broken at all, the extract is not obtained. In general, pale malts are ground larger than amber, or brown malts.

Malt should be used within 2 or 3 days after it is ground, but in the London brewhouses, it is generally ground one day and used the next. A quarter of malt ground should yield 9 bushels, and sometimes 10. Crushing mills or iron rollers, have lately been used in preference to stones which make considerable grit with the malt. On a small scale, malt may be broken by wooden rollers, by the hand.

Steel mills like coffee mills have also been used for crushing malt with great success.

To determine the qualities of malt.

First, examine well if it has a round body, breaks soft, is full of flour all its length, smells well, and has a thin skin; next chew some of it, and if sweet and mellow, then it is good. If it is hard and steely, and retains something of a barley nature, it has not been rightly made, and will weigh heavier than that which has been properly malted.

Secondly, take a glass nearly full of water; put in some malt, and if it swims, it is good, but if any sinks to the bottom then it is not true malt.

Pale malt is the slowest and least dried, producing more wort than high dried malt, and of better quality.—Amber coloured malt, or that between pale and brown, produces a flavour much admired in many malt liquors. Brown malt loses much of its nutritious qualities, but confers a peculiar flavour desired by many palates. Roasted malt, after the manner of coffee, is used by the best London brewers, to give colour and flavour to porter, which in the first instance has been made from pale malt. The most delicately roasted malt for this purpose is made by Mr. Hunt, the proprietor of the well known breakfast powder. He excludes the atmospheric air, and all effluviæ from the fire, by an apparatus of his own invention, and hence the perfection of his breakfast powder, and consequently of his roasted malt.

To choose hops.

Rub them between the fingers or the palm of the hand, and if good, a rich glutinous substance will be felt, with a fragrant smell, and a fine yellow dust will appear. The best colour is a fine olive green, but if two green, and the seeds are small and shrivelled, they have been picked too soon and will be deficient in flavour. If of a dusty brown colour, they were picked too late, and should not be chosen. When a year old, they are considered as losing one-fourth in strength. The best and dearest is the Farnham hop: East Kents are the next, but those of Sussex and Worcestershire are not so strong.

To determine the proportion between the liquor boiled and the quantity produced.

From a single quarter, two barrels of liquor will produce but one barrel of wort. Three barrels will produce one barrel three quarters. Four barrels will produce two barrels and a half. Five barrels will produce three barrels and a quarter. Six barrels will produce four barrels. Eight barrels will produce five barrels and a half, and ten barrels will produce seven barrels, and so in proportion for other quantities.

To determine the heats of the liquor or water for the first and second mashes on different kinds of malt.

First mash.—For very pale malt turn on the liquor at 176°. For pale and amber mixed, 172°, all amber, 170°, high-coloured amber, 168°. An equal quantity of pale, amber, and brown, 160°. If the quantity of brown is very dark, or any part of the grains charred by the fire upon the kiln, 155°.

Second mash.—For very pale malt turn on the liquor at 182°. For pale and amber mixed, 178°, all amber, 176, high coloured amber, 172°. An equal quantity of pale, amber, and brown, 166°. If the quantity of brown is very dark, or any part of the grains charred by the fire, 164°.

The heat should in some measure be regulated by the temperature of the atmosphere, and should be two or three degrees higher in cold than in warm weather.

The proper degree of heat will give the strongest wort and in the greatest quantity, for though the heat were greater and the strength of the wort thereby increased, yet a greater quantity of liquor would be retained in the malt; and again, if it were lower, it would produce more wort, but the strength of the extract would be deficient; the beer without spirit, and likely to turn sour.

To mash without a thermometer.

As diminished evaporation takes place on the surface of water just before it boils, many practical private brewers turn on, as soon as the diminished evaporation enables them to see their faces on the smooth surface of the water, when it is probably at about the heat actually used by public brewers, who adopt thermometers.

Others use boiling liquor throughout, but lower the temperature, by gradual applications to the malt: thus, they turn a few pailsful of the boiling liquor into the mash tub, which being thus somewhat cooled, a quantity of the malt is turned in and saturated with the water; the mass being then considerably lower than the boiling heat, they turn without reserve boiling water upon it, which being somewhat cool by the mass, more malt is turned in, and so alternately till the whole is mixed, which they continue to mash for an hour.

To determine the strength of the worts.

To effect this a saccharometer is necessary, and may be purchased at any mathematical instrument maker's. It determines the relative gravity of wort to the water used, and the quantity of farinaceous matter contained in the wort. It is used in all public breweries after drawing off the wort from each mash, and regulates the heat and quantity of liquor turned on at each succeeding mash, that the ultimate strength may be equal though the quantity is less. This signifies little to the private, but it is of great consequence to the public brewer. Those who brew frequently and desire to introduce it will obtain printed tables and instructions with the instrument.

To proportion the hops.

The usual quantity is a pound to the bushel of malt, or eight pounds to the quarter; but for keeping-beer, it should be extended to ten, or twelve, and if for one or two years, to fourteen pounds the quarter. Small beer requires from three to six pounds the quarter, and rather more when old hops are used.

Some persons instead of boiling the hops with the wort, macerate them, and put the strong extract into the tun with the first wort, and make two or three extracts in like manner for the second and third worts.

To boil worts.

The first wort should be sharply boiled for one hour, and the second for two hours. But if intended for beer of long-keeping, the time should be extended half an hour. The hops should be strained from each preceding wort, and returned into the copper with the succeeding one. Between the boilings the fire should be damped with wet cinders, and the copper door set open.

For small beer only half an hour is necessary for the first wort, 1 hour for the second, and 2 hours for the third. The diminution from boiling is from one-eighth to one sixteenth.

To cool the worts.

Worts should be laid so shallow as to cool within six or seven hours to the temperature of sixty degrees. In warm weather, the depth should not exceed two or three inches; but in cold weather it may be five inches. As soon as they have fallen to 60 degrees, they should instantly be tunned and yeasted.

To choose heats for tunning.

In cold weather, the heats in the coolers should be five or six degrees higher than in mild and warm weather. For ale, in cold weather, it should be tunned as soon as it has fallen to sixty degrees in the coolers. For porter, to sixty-four degrees, and for table beer to seventy-four; and in warm weather, strong beer should be four or five degrees less, and table beer seven or eight degrees. Care should be also taken that the worts do not get cold before the yeast is mixed to produce fermentation. The best rule for mixing the yeast is a pound and a half to every barrel of strong beer wort, and a pound to every barrel of table beer wort.

To mix the yeast with the worts.

Ale brewed for keeping in winter should be no more than blood warm when the yeast is put to it. If it is intended for immediate drinking, it may be yeasted a little warmer. The best method of mixing the yeast is to take two or three quarts of the hot water wort in a wooden bowl or pan, to which when cool enough, put yeast enough to work the brewing: generally one or two quarts to the hogshead, according to its quality. In this bowl or pan the fermentation will commence while the rest of the worts are cooling, when the whole may be mixed together.

To apportion yeast and apply it to the worts.

The yeast of strong beer is preferable to that from small beer, and it should be fresh and good. The quantity should be diminished with the temperature at which the worts are tunned, and less in summer than in winter. For strong beer, a quart of yeast per quarter will be sufficient at 58 degrees, but less when the worts are higher, and when the weather is hot. If estimated by the more accurate criterion of weight, 1 1-2 lbs. should be used for a barrel of strong beer, and 1 1-4 lbs. for a barrel of small beer. If the fermentation does not commence, add a little more yeast, and rouse the worts for some time. But if they get cold, and the fermentation is slow, fill a bottle with hot water and put it into the tun.

In cold weather small beer should be tunned at 70 degrees, keeping beer at 56 degrees, and strong beer at 54 degrees. In mild weather at 50 degrees for each sort. The fermentation will increase the heat 10 degrees.

To manage the fermentation.

A proportion of the yeast should be added to the first wort as soon as it is let down from the coolers, and the remainder as soon as the second wort is let down.

The commencement of fermentation is indicated by a line of small bubbles round the sides of the tun, which in a short time extends over the surface. A crusty head follows, and then a fine rocky one, followed by a light frothy head. In the last stage, the head assumes a yeasty appearance, and the colour is yellow or brown, the smell of the tun becoming strongly vinous. As soon as this head begins to fall, the tun should be skimmed, and the skimming continued every two hours till no more yeast appears: this closes the operation, and it should then be put into casks, or, in technical language, cleansed. A minute attention to every stage of this process is necessary to secure fine flavoured, and brilliant beverage. Should the fermentation be unusually slow, it should be accelerated by stirring or rousing the whole. After the first skimming, a small quantity of salt and flour, well mixed, should be stirred in the tun. The fermentation will proceed in the casks, to encourage which, the bung-hole should be placed a little aside, and the casks kept full, by being filled up from time to time with old beer. When this fermentation has ceased, the casks may be bunged up.

To accelerate the fermentation.

Spread some flour with the hand over the surface, and it will form a crust, and keep the worts warm;—or throw in an ounce or two of powdered ginger;—or, fill a bottle with boiling water, and sink it in the worts;—or, heat a small quantity of the worts and throw into the rest;—or, beat up the whites of two eggs with some brandy, and throw it into the tun or cask;—or, tie up some bran in a coarse thin cloth and put it into the vat; and above all things do not disturb the wort, as fermentation will not commence during any agitation of the wort.

To check a too rapid fermentation.

Mix some cold raw wort in the tun, or divide the whole between two tuns, where, by being in smaller body, the energy of the fermentation of the whole will be divided. Also, open the doors and windows of the brew-house; —but, if it still frets, sprinkle some cold water over it;—or, if it frets in the cask, put in a mixture of a quarter of a pound of sugar, with a handful of salt, to the hogshead.

To brew porter on the London system.

Thames or New River water is indifferently used, or hard water, raised into backs, and exposed for a few days to the air.

Take a mixture of brown amber and pale malts, nearly in equal quantities, and turn them into the mash-tub in this order. Turn on the first liquor at 165 degrees; mash one hour, and then coat the whole with dry malt. In one hour set the tap.

Mix 10 lbs. of brown hops to the quarter of malt, half old, half new; boil the first wort briskly with the hops, for three quarters of an hour, and after putting into the copper 1 1-2 lbs. of sugar, and 1 1-2 lbs of Leghorn juice (extract of liquorice,) to the barrel, turn the whole into the coolers, rousing the wort all the time.

Turn on the second liquor at 174 degrees, and in an hour set tap again. This second wort having run off, turn on again at 145 degrees; mash for an hour, and stand for the same; in the mean time boiling the second wort with the same hops for an hour. Turn these into the coolers as before, and let down into the tub at 64 degrees, mixing the yeast as it comes down. Cleanse the second day at 80 degrees, previously throwing in a mixture of flour and salt, and rousing thoroughly.

For private use, every quarter of malt ought to yield two barrels and a half, but brewers would run three barrels to a quarter.

Another method.

The following article is to be considered as applicable when not less than 50 quarters of malt are used.

The liquor for the first mash should be heated in the copper to 150 degrees, in the proportion of two barrels to each quarter of malt, which is to be an equal mixture of pale amber and brown malts. These are mashed about three quarters of an hour; the liquor is then allowed to stand on the goods an hour. The top of the mash tun is next opened to let off the liquor as quickly as possible; and the top is to be left open till the next liquor is brought into the tun, that the goods may drain. During this, the second liquor has been heating, and may at two hours and three quarters, or three hours from the beginning, have acquired the heat of 160 degrees, the quantity being one barrel to a quarter of malt. Mash this half, for three quarters of an hour; let it stand one hour, and then let it be run off in the course of half an hour more; at about five hours and a half from the beginning, the third mash should be made at 180 degrees; the quantity being one barrel to the quarter. Mash this half an hour, let it stand one hour, and tap as before.

A fourth liquor is seldom mashed, but if it is, it may be cold or blood warm as it is of no use but to make the sour beer for finings, and it is of little consequence how it is done. Some brewers use it for the first liquor of the next brewing, but this is not perhaps a good plan, as it often becomes foxed, and then it taints the whole brewing. These worts are to be boiled with from 12 to 14 pounds of hops to the quarter of malt, if the liquor is intended for keeping 8 or 12 months, but in the ordinary run of porter, not intended for keeping, 5 lbs. may be sufficient. The first wort should be boiled one hour, the second two hours, and the third four hours.

The worts are now to be cooled down as expeditiously as the weather will permit, to about 60 degrees, if the medium heat of the atmosphere is about 60 degrees; if it is more or less, allowance must be made as before directed. All the three worts are to be brought into the square together, and about five pints of yeast to the quarter of malt put in; the proportion of colouring is arbitrary, as it depends upon the colour of the malt.

To brew three barrels of porter.

Take 1 sack of pale malt, 1-2 sack of amber do. and 1-2 sack of brown do.

Turn on two barrels for first mash at 165 degrees;—second mash, one barrel and a half at 172 degress;—third mash, two barrels, at 142 degrees. Boil 10 lbs. of new and old hops, and 2 oz. of porter extract, in the first wort. Cool, ferment, and cleanse according to the previous instructions.

To brew porter on Mr. Morrice's plan.

Commence at five o'clock in the morning; thermometer in the air 34 degrees. Take of West country pale malt, 3 quarters, Herts pale malt, 6 quarters, Herts brown malt, 8 quarters, hops, 1 cwt. 2 quarters, Leghorn juice, 30 lbs. porter extract, 4 lbs.

Charge the first great copper with 52 barrels, and raise to 155 degrees. Mash for one hour, and set the tap at 7 o'clock, at 137 degrees.

Charge copper with 36 barrels, and raise to 160 degrees. Mash, and set tap at 146 degrees. Boil first wort.

Charge copper for third mash with 59 barrels, and raise to 150 degrees. Mash a quarter of an hour, and set tap at 132 degrees; boil second wort an hour and a half. Tun at 64 degrees. Cleanse in two days 88 barrels.

Brown stout.

The procedure is the same as in the preceding article, except that one third, or half the malt should be brown.

London ale.

Almost every country in England, has its variety of ale, but the difference consists chiefly (the same quantity of malt and hops being used) in the preparation of the malt: Water may, in some cases, vary in quality, the boiling may be longer, or shorter, or the liquor may be turned on at a different heat, but these varieties being considered, one general process serves for the whole. For good ale, the malt and hops should be of the best quality. For immediate use, the malt should be all pale, but if brewed for keeping, or in warm weather, one fourth should be amber malt. Six pounds of Kentish hops should be used to the quarter, or 10 lbs. for keeping ale.

To brew two barrels from a quarter of malt.

In the brewing of one quarter, turn on two barrels at 175 degrees; mash one hour, and let it stand for the same time.

For second mash, turn on one barrel at 160 degrees. Mash one hour and stand one hour; boil the first wort briskly for one hour; and boil the second two hours, or till the whole is two barrels. Cool down to 60 degrees and tun. Cleanse on the 4th day at 72 degrees, previously mixing two ounces of ginger, 1-2 an ounce of salt, and a handful of flour.

Keep the working tun closely covered, and just before the head begins to fall, skim the top, and rouse in the rest. When the blebs are large and on the fret, rouse in 1-2 an ounce of salt of tartar, a handful of malted bean-flour, and some fresh yeast, after which it will ferment more kindly, and the cleansing may soon follow, with the new head on. Take care to fill up the casks while working, and before bunging put a handful of scalded hops into each. Sometimes the fermentation is conducted by skimming, as soon as the head bears a yeasty appearance: then by skimming and rousing as often as other heads arise, till no other head appears.

Or, cleansing may take place without skimming or rousing, as soon as the head begins to fall, taking care, by means of a pipe rising within the tun, that the yeast does not pass into the barrels. The quantity of hops boiled in the wort should vary according to the intention. Six pounds will suffice for ale for present use.

In the above instance a barrel and a quarter of liquor at 150 degrees may afterwards be tunned for a barrel of table beer.

To brew ale in small families.

A bushel and three quarters of ground malt, and a pound of hops, are sufficient to make 18 gallons of good family ale. That the saccharine matter of the malt may be extracted by infusion, without the farina, the temperature of the water should not exceed 155 or 160 deg. Fahrenheit's thermometer. The quantity of water should be poured on the malt as speedily as possible, and the whole being well mixed together by active stirring, the vessel should be closely covered over for an hour; if the weather be cold, for an hour and a half. If hard water be employed, it should be boiled, and the temperature allowed, by exposure to the atmosphere, to fall to 155 or 160 degrees Fahrenheit; but if rain water is used, it may be added to the malt as soon as it arrives to 155 degrees. During the time this process is going on, the hops should be infused in a close vessel, in as much boiling water as will cover them, for two hours. The liquor may then be squeezed out, and kept closely covered.

The hops should then be boiled for about ten minutes, in double the quantity of water obtained from the infused hop, and the strained liquor, when cold, may be added with the infusion, to the wort, when it has fallen to the temperature of 70 deg. The object of infusing the hop in a close vessel previously to boiling, is to preserve the essential oil of the hop, which renders it more sound, and, at the same time, more wholesome. A pint of good thick yeast should be well stirred into the mixture of wort and hops, and covered over in a place of the temperature of 65 deg. Fahrenheit; and when the fermentation is completed, the liquor may be drawn off into a clean cask previously rinsed with boiling water. When the slow fermentation which will ensue has ceased, the cask should be loosely bunged for two days, when, if the liquor be left quiet, the bung may be properly fastened. The pale malt is the best, because, when highly dried, it does not afford so much saccharine matter. If the malt be new, it should be exposed to the air, in a dry room, for two days previously to its being used; but if it be old, it may be used in 12 or 20 hours after it is ground. The great difference in the flavour of ale, made by different brewers, appears to arise from their employing different species of the hop.

Another method of brewing ale.

For 36 gallons, take of malt (usually pale,) 2 1-2 bushels, sugar, 3 lbs. just boiled to a colour, hops, 2 lbs. 8 oz. coriander seeds, 1 oz. capsicum, 1-2 a drachm.

Work it 2 or 3 days, beating it well up once or twice a day; when it begins to fall, cleanse it by adding a handful of salt, and some wheat-flour.

Table beer only, from pale malt.

The first mash should be at 170 deg., viz. two barrels per quarter; let it stand on the grains three-quarters of an hour in hot weather, or one hour if cold. Second mash, 145 deg., at 1 1-2 barrels per quarter, stands half an hour. Third, 165 deg., two barrels per quarter stands half an hour. Fourth, 130 deg., three barrels, stands two hours. The first wort to be boiled with 6 lbs. of hops per quarter, for an hour and a half, the second wort to be boiled with the same hops two hours, and the remainder three hours. The whole to be now heated as low as 55 deg., if the weather permits, and put to work with about 5 pints of yeast per quarter; if the weather is too warm to get them down to 55 deg., a less proportion will be sufficient. The eight barrels of liquor first used, will reduced to six of beer to each quarter; one barrel being left in the grains, and another evaporated in boiling, cooling, and working.

Table beer from sugar.

To 4 pounds of coarse brown sugar, add 10 gallons of water, then put in three ounces of hops, and let the whole boil for three quarters of an hour, and work it as usual. It should be kept a week or 10 days before it is tapped, when it willl improve daily afterwards, within a moderate time of consumption.

Table beer from treacle.

Another method, and for a smaller quantity, is, to put a pound of treacle to eight quarts of boiling water: add two bay-leaves, and a quarter of an ounce of ginger in powder. Boil the whole for fifteen minutes, then let it become cool, and work it with yeast.

Another method.

For ten barrels: Take of malt, 8 bushels, hops, 8 pounds, sugar, 8 pounds made into colour, Spanish liquorice, 8 oz. treacle, 10 lbs. Proceed as above.

Ale and small beer on Mr. Cobbet's plan.

Utensils.

These are first, a copper, costing 5*l.* that will contain at least 40 gallons.

Second, a mashing-tub, costing 30*s.* to contain 60 gallons; for the malt is to be in this along with the water. It must be a little broader at top than at bottom, and not quite so deep as it is wide across the bottom. In the middle of the bottom there is a hole about two inches over, to draw the wort off. Into this hole goes a stick a foot or two longer than the tub is high. This stick is to be about two inches through, and tapered for about eight inches upwards, at the end that goes into the hole, which at last it fills up as closely as a cork. Before any thing else is put into the tub, lay a little bundle of fine birch about half the bulk of a birch broom, and well tied at both ends. This being laid over the whole (to keep back the grains as the wort goes out) put the tapered end of the stick down through it into the hole, and thus cork the hole up. Then have something of weight sufficient to keep the birch steady at the bottom of the tub, with a hole through it to slip down the stick; the best thing for this purpose will be a *leaden collar* for the stick, with the hole large enough, and, it should weigh three or four pounds.

Third, an underback, or shallow tub, costing 25*s.* to go under the mash-tub for the wort to run into when drawn from the grains.

Fourth, a tun-tub, that will contain 30 gallons, to put the ale into to work, the mash-tub serving as a tun-tub for the small beer. Besides these, a couple of coolers, or shallow tubs, about a foot deep; or, if there are four it may be as well, in order, to effect the cooling more quickly; the whole costing 25*s.*

Process of brewing the ale.

Begin by filling the copper with water, and next by making the water, boil. Then put into the mashing-tub water sufficient to stir and separate the malt. The degreee of heat that the water is to be at, before the malt is put in, is *one hundred and seventy degrees* by the thermometer: but, without one, take this rule: when you can, looking down into the tub, see your face clearly in the water, the water is hot enough. Now put in the malt and stir it well in the water. In this state it should continue for about a quarter of an hour. In the meanwhile fill up the copper, and make it boil; and then put in boiling water sufficient to give eighteen gallons of ale.

When the proper quantity of water is in, stir the malt again well, and cover the mashing-tub over with sacks, and there let the mash stand for two hours: then draw off the wort. The mashing-tub is placed on a couple of stools, so as to be able to put the underback under it, to receive the wort, as it comes out of the hole. When the underback is put in its place, let out the wort by pulling up the stick that corks the hole. But, observe, this stick (which goes six or eight inches through the hole) must be raised by degrees, and the wort must be let out slowly in order to keep back the sediment. So that it is necessary to have something to keep the stick up at the point where it is to be raised, and fixed at for the time. To do this the simplest thing is a stick across the mashing-tun.

As the ale-wort is drawn off into the small under-back, lade it out of that into the tun-tub; put the wort into the copper, and add a pound and a half of good hops, well rubbed and separated as they are put in. Now make the copper boil, and keep it, with the lid off, at a good brisk boil for a full hour, or an hour and a half. When the boiling is done, put the liquor into the coolers; but strain out the hops in a small clothes-basket, or wicker-basket. Now set the coolers in the most convenient place, in doors, or out of doors, as most convenient.

The next stage is the tun-tub, where the liquor is set to work. A great point is, the degree of heat that the liquor is to be at, when it is set to work. The proper heat is seventy degrees; so that a thermometer makes the matter sure. In the country they determine the degree of heat by merely putting a finger into the liquor.

When cooled to the proper heat, put it into the tun-tub, and put in about half a pint of good yeast. But the yeast should first be put into half a gallon of the liquor, and mixed well; stirring in with the yeast a handful of wheat or rye-flour. This mixture is then to be poured out clean into the tun-tub, and the mass of the liquor agitated well, till the yeast be well mixed with the whole. When the liquor is thus properly put into the tun-tub and set a working, cover over the top, by laying a sack or two across it.

The tun-tub, should stand in a place neither too warm nor too cold. Any cool place in summer, and any warm place in winter, and if the weather be *very cold*, some cloths or sacks should be put round the tun-tub while the beer is working. In about six or eight hours a frothy head will rise upon the liquor; and it will keep rising, more or less slowly, for 48 hours. The best way is to take off the froth, at the end of about 24 hours, with a common skimmer, and in 12 hours take it off again, and so on, till the liquor has *done working*, and sends up no more yeast. Then it is *beer*; and, when it is *quite cold*, (for *ale* or *strong beer*,) put it into the *cask* by means of a *funnel*. It must be cold before this is done, or it will be *foxed;* that is, have a rank and disagreeable taste.

The cask should *lean a little on one side* when filling it, because the beer will *work again*, and send more yeast out of the bung hole. Something will *go off in this working*, which may continue for two or three days, so that when the beer is putting in the cask, a *gallon or two should be left*, to keep filling up with as the working produces emptiness. At last, when the working is completely over, block the cask up to its level. Put in a handful of *fresh hops;* fill the cask quite full and bung it tight, with a bit of *coarse linen* round the bung.

When the cask is *empty*, great care must be taken to cork it *tightly up*, so that no air gets in; for, if so, the cask is *moulded* and *spoiled for ever.*

The small beer.

Thirty-six gallons of boiling water are to go into the mashing-tub; the grains are to be well stirred up, as before; the mashing-tub is to be covered over, and the mash is to stand in that state for *an hour;* then draw it off, into the tun-tub.

By this time the copper will be *empty* again by putting the ale liquor to cool. Now put the small beer wort *into the copper* with the hops used before, and with *half a pound of fresh hops* added to them; and this liquor boil briskly for *an hour.*

Take the grains and the sediment clean out of the mashing-tub, put the birch twigs in again, and put down the stick as before. Put the basket over, and take the liquor from the copper (putting the fire out first) and pour it into the mashing-tub through the basket. Take the basket away, throw the hops to the dunghill, and leave the small beer liquor *to cool in the mashing-tub.*

Here it is to remain to be *set to working;* only *more yeast* will be wanted *in proportion;* and there should be for 36 gallons of small beer, three half pints of good yeast.

Proceed now, as with the ale, only, in the case of the small beer, it should be put into cask, not *quite cold;* but a *little warm;* or else it will not work in the barrel, which it ought to do. It will not work so strongly nor so long as ale; and may be put into the barrel much sooner; in general the next day after it is brewed.

All the utensils should be well cleaned and put away as soon as they are done with. "I am now," says Mr. Cobbet, "in a farm house, where the *same set of* utensils have been used for *forty years;* and the owner tells me, that they may last for *forty years longer.*"

To brew ale and porter from sugar and malt.

To every quarter of malt take 100 pounds of brown sugar, and in the result, it will be found that the sugar is equal to the malt. The quarter of malt is to be brewed with the same proportions, as though it were two quarters; and sugar is to be put into the tun, and the first wort let down upon it, rousing the the whole well together.

The other worts are then to be let down, and the fermentation, and other processes carried on as in the brewing of malt.

To brew four bushels of malt, with only one copper, mash-tub, and cooler.

If the mash-tub holds two barrels, it is better than a smaller one, that there may be room enough for mashing; in such a one fix a brass cock of three quarters of an inch bore, let it be a plug and a basket. Use soft water (for brown or amber malt,) covered with three or four handsful of malt or bran, if the water is thoroughly clear, if not, put as much salt as will lie on a crown-piece, into a copper that holds at least one barrel, containing 36 gallons; and as it heats and the scum rises, take it off before it boils in. Then, when it begins to boil, lade two pailsful first into the mash-tub, and put two pails of cold water into the copper in their room, and just boil all again; then convey all the hot water into the mash-tub, and, when the face can be seen in it, mix the malt a little at a time. Wash, and let all stand two hours under a cover of cloths; at the end of which run a drisling stream, and faster by degrees, on a few hops, to secure it. While the first wort is standing and running off, another copper must boil to clean vessels, and what is used this way is to be supplied by adding more cold water, and boiling it again, two pailsful of which are to be thrown on the grains, as the first wort runs off. These four pailsful of hot water are allowed for the malt to absorb, being a bucket to each bushel, and thus the brewer has nearly a full barrel of first wort come off, which is to be boiled with half a pound of hops till it breaks, first into very small particles, and then into larger, till the flakes are as large as wheat chaff. As soon as the first wort has run off from the mash-tub, the second copper of boiling water is to be put over the grains and mashed. This is to stand one hour before it is begun to be discharged; and, while this is standing and running off, the first wort is to be boiled and put into coolers, and a third copper of only heated water is to be thrown over the grains, as soon as the second wort is spent off, which also is to be mashed.

While this is standing for one hour, and then run off, boil the second wort with half a pound of fresh hops, till it breaks into small particles, and immediately after boil the third copper, with 4 ounces of fresh hops during one hour, for this last wort is to meagre to shew its time by breaking.

By this method, in a barrel copper, may be boiled thirty-one gallons of neat first wort, which is to be cooled, worked, and then put into two kilderkins, one of entire ale, but the second a little weaker on account of having had five gallons of the second wort put into it to fill up. Besides this, the brewer will have a hogshead of good small beer, made with the second and third coppers of after-worts.

To brew Welch ale.

Take 3 quarters of the best pale malt, 25 lbs. of hops, 7 lbs. of sugar, and 3-4 lb. grains of paradise.

Turn on the first liquor at 178 degrees. Mash for an hour and a half, and stand two hours. Turn on the second liquor at 190 degrees, and stand two hours. Boil an hour and a half, and put in the sugar just before turning into the coolers. Pitch the tun at 62 degrees and put in the liquorice root. Cleanse at 80 degrees, using salt and flour.

After the second mash, turn on for table beer at 150 degrees. Mash three quarters of an hour, and stand two hours.

To brew Burton ale.

Of this strong ale, only a barrel and a half is drawn from a quarter, at 180 degrees for the first mash, and 190 degrees for the second, followed by a gyle of table beer. It is tunned at 58 degrees, and cleansed at 72 degrees. The Burton brewers use the finest pale malt, and grind it a day or two before being used. They employ Kentish hops, from six to eight pounds per quarter.

To brew Ringwood ale.

This brewing produces two buarrels and a half from the quarter. The best pale malt and pocket hops are used at the rate of six pounds to the quarter. Turn on first mash at 180 degrees, and second mash at 190 degrees. Pitch the tun at 60 degrees, and cleanse at 80 degrees. Mash successively one hour, and three quarters of an hour, standing an hour and a half, and two hours. Add in the tun two pounds of yeast for every barrel, and coat with salt and flour after the first skimming.

After the second mash, turn on for table beer, at 150 degrees.

To brew Nottingham ale in the small way.

The first copperful of boiling water is to be put into the mash-tub, there to lie a quarter of an hour, till the steam is far spent; or as soon as the hot water is put in, throw into it a pail or two of cold water, which will bring it at once to a proper temperature; then let three bushels of malt run leisurely into it, and stir or mash all the while, but no more than just to keep the malt from clotting or balling; when that is done, put one bushel of dry malt at the top, and let it stand covered two hours, or till the next copperful of water is boiled, then lade over the malt three hand-bowlsful at a time. These run off at the cock or tap by a very small stream before more is put on, which again must be returned into the mash-tub till it comes off exceedingly fine. This slow way takes sixteen hours in brewing four bushels of malt. Between the ladings, put cold water into the copper to boil, while the other is running off; by this means, the copper is kept up nearly full, and the cock is kept running to the end of the brewing. Only twenty-one gallons must be saved of the first wort, which is reserved in a tub, wherein four ounces of hops are put, and then it is to be set by.

For the second wort there are twenty gallons of water in the copper boiling which must be laded over in the same manner as the former, but no cold water need be mixed. When half of this is run out into a tub, it must be directly put into the copper with half of the first wort, strained through the brewing sieve as it lies on a small loose wooden frame over the copper, in order to keep those hops that were first put in to preserve it, which is to make the first copper twenty-one gallons. Then, upon its beginning to boil, put in a pound of hops in one or two canvas bags, somewhat larger than will just contain the hops, that an allowance may be given for their swell; this boil very briskly for half an hour, when take the hops out and continue boiling the wort by itself till it breaks into particles a little ragged; it is then done, and must be dispersed into the cooling tubs very shallow. Put the remainder of the first and second wort together, and boil it in the same manner, and with the same quantity of fresh hops, as the first.

By this method of brewing, ale may be made as strong or as small as is thought fit, and so may the small beer that comes after.

To brew Dorchester ale.

Boil the water, and let it stand till the face can be seen in it; then put the malt in by degrees, and stir it; let it stand two hours; then turn on the proper complement. Boil the wort and hops thirty minutes; cool it as soon as possible, stirring it so that the bottoms may be mingled; then set it in the gyle-tun, until it gathers a head, which must be skimmed off; then put in the yeast, and work it till the head falls; then cleanse it, keeping the cask filled up so long as it will work.

The malts used are 1-3d pale, and 2-3ds amber, with six or seven pounds of hops to the quarter. By the thermometer, the heat of the first liquor is 170 degrees, and of the second 180 degrees, and the produce is two barrels per quarter.

To brew Essex ale.

Procure two mashing-tubs, one that will mash 4 bushels, and the other 2, and a copper that holds half a hogshead. The water, when boiled, is put into the largest tub, and a pail of cold water immediately on that: then put the malt in by a hand-bowlful at a time, stirring it all the while, and so on in a greater quantity by degrees; (for the danger of balling is mostly at first) till at last half a bushel of dry malt is left for a top-cover; thus let it stand three hours. In the mean while, another copper of water is directly heated, and put as before into the other mash-tub, for mashing two bushels of malt, which stands that time. Then, after the wort of the four bushels is run off, let that also of the two bushels spend, and lade it over the four bushels, the cock running all the while, and it will make in all a copper and a half of wort, which is boiled at twice; that is, when the first copper is boiled an hour, or till it breaks into large flakes, then take half out, and put the remaining raw wort to it, and boil it about half an hour till it is broke. Now, while the two worts are running off, a copper of water almost scalding hot is made ready, and put over the goods or grains of both tubs: after an hour's standing the cock is turned, and this second wort is boiled away, and put over the grains of both tubs to stand an hour; when off, it is put into the copper and boiled again, and then serves hot instead of the first water, for mashing four bushels of fresh malt; after it has again lain three hours, and is spent off, it is boiled; but while in the mash tub, a copper of water is heated to put over the goods or grains which stands an hour, and is then boiled for small-beer. And thus may be brewed 10 bushels of malt with 2 pounds and a half of hops for the whole.

To brew Barnstable ale.

Boil the water, then throw two pails of cold into the mash-tun, and afterwards the boiling water; then immediately put in the malt, half a bushel at a time. After stirring it till all is soaked, cap it with malt or bran, and cover it close to stand three hours, then see if the mash is sunk in the middle, which it will sometimes do, and when it does, it shows the strength, and must be filled level with boiling water, to stand half an hour after, when it is to be run off in a goose quill stream, which is to be returned upon the grains again, by a bowl or pailful at a time, as far back as possible from the cock; for then the liquor strains through the body of the grains, and at last comes very fine. Otherwise the thick parts are forced down to the cock. This is called doubling; continue to do so for half an hour, then stop, and let it stand half an hour longer in winter, but not in summer. Then rub four pounds of hops very fine into the sieve for the wort to run off; do not draw if off too near before lading over more boiling water out of the copper. This is to be continued till the whole quantity of ale wort is obtained, which, with all the hops, is to be boiled till the liquor breaks or curdles. Now empty all into large earthen long pans or coolers. This work, when cold with the same hops altogether thus, put a little yeast (as little as possible,) and that not a day old, to a quantity, and mix that with all the rest to work twelve or fourteen hours, and then strain it directly into the barrel, where keep filling it until it is done working.

To brew Edinburgh ale.

Adopt the best pale malt.

1st. Mash two barrels per quarter, at 183 deg. (170;) mash three quarters of an hour; let it stand one hour, and allow half an hour to run off the wort.

2nd. Mash one barrel per quarter, at 190 deg. (183:) mash three quarters of an hour, let it stand three quarters of an hour, and tap as before.

3d. Mash one barrel per quarter, at 160 deg.; mash half an hour, let it stand half an hour, and tap as before.

The first and second wort may be mixed together, boiling them about an hour or an hour and a quarter, with a quantity of hops proportioned to the time the beer is intended to be kept.

The two first may be mixed at the heat of 60 or 65 deg. in the gyle-tun, and the second should be fermented separately for small beer.

To brew Windsor ale.

Take 5 quarters of the best pale malt, half a cwt. of hops, 8 lbs of honey. 1 lb. of coriander seed, half lb. of grains of paradise, half lb. of orange peel, and 2 and a 1-2 lbs. of ground liquorice root.

The hops should be of the best kind, and soaked all night in cold liquor. Turn on at 180 deg. mash thoroughly an hour and a quarter, and stand an hour. Boil one hour.

Turn on second liquor at 195 deg. and stand three quarters of an hour. Boil three hours.

Turn on third liquor at 165 deg. mash three quarters of an hour, and stand the same. Pitch the tun at 60 deg. and cleanse at 80 on the third day. Skim as soon as a close yeasty head appears, until no yeast arises. Half a pound of hops per quarter should be roused in, and the whole left to settle. Also rouse in six ounces of salt, half a pound of flour, six ounces of ground ginger, and six ounces of ground caraway seed.

The drugs above-mentioned are forbidden, under the penalty of two hundred pounds, and the forfeiture of all utensils; but of course private families are at liberty to use whatever they please. Nothing but malt and hops are permitted to public brewers, except the colouring extract; and druggists who sell to brewers are subject to a penalty of five hundred pounds.

Windsor ale yields about 2 1-2 barrels to the quarter.

To brew with Needham's portable machine, by which the malt is boiled without m

The saving, by brewing one bushel of malt, is above half.

The machine being placed ready for use, put the malt into the cylinder, (taking care none goes into the centre nor between the cylinder and outside boiler,) add fourteen gallons of cold water to each bushel of malt, then light the fire, and raise the liquor to 180 degrees of heat, as soon as possible, which must be ascertained by dipping the thermometer one minute into the liquor. Stir the malt well up with a mashing stick, or mashing iron, for ten minutes, to divide every particle of malt from each other, keeping the heat from 170 to 180 degrees for two hours (to prevent the liquor from being over heated, damp the fire with wet ashes, and leave the door open); then draw off the wort very gently (that it may run fine) into one of the coolers, and put all the hops (rubbing them to break the lumps) on the top of the wort, to keep it hot till the time for returning it into the machine. Having drawn off the ale wort, put into the machine ten gallons of cold water to each bushel of malt. Brisken the fire, and make the liquor 180 degrees of heat, as soon as possible, which must be ascertained by dipping the thermometer one minute into the liquor. Having ascertained that the liquor is at 180 degrees of heat, stir the malt well up, as before, for ten minutes, keeping the heat from 170 to 180 degrees for one hour and a half; then draw off this table-beer wort into the other cooler, and cover it over to keep it hot, until time for returning it into the machine for boiling. Having drawn off the table beer wort, clean the machine from the grains, and return the first wort into the machine, with all the hops, taking care the hops are all within the cylinder, and that none of them get into the centre or between the cylinder and outer boiler. Make it boil as quick as you can, and let it boil one hour; after which damp the fire, and draw it off into a cooler or coolers, which should be placed in the air, where it will cool quick; then return the second wort into the machine, to the hops, make it boil as quick as you can, and let it boil one hour; put out the fire; draw off the wort, and put it into a cooler placed in the air to cool quick. When the worts in the cooler are cooled down to 70 degrees of heat by the thermometer, put the proportion of a gill of fresh thick yeast to every nine gallons of wort into the coolers, first thinning the yeast with a little of the wort before you put it in, that it may the better mix; and when the ale wort is cooled down to 60 degrees of heat, draw it off from the coolers, with the yeast and sediment, and put it into the machine boiler (the machine boiler having been previously cleared from the hops and cylinder,) which forms a convenient vessel, placed on its stand, for the ale to ferment in, which must be kept fermenting in it with the cover on, until the head has the appearance of a thick brown yeast on the surface, an inch or two deep, which will take three or four days—[N. B. If the temperature of the weather is below 55 degrees of heat by the thermometer, it will be better to place the fermenting vessel in a situation not exposed to the cold;]—when the head has this appearance, draw off the beer from the yeast and bottoms into a clean cask, which must be filled full, and when done working, put in a handful of dry hops, bung it down tight, and stow it in a cool cellar. This ale will be fit to tap in three or four weeks.

The second wort for table beer should be put from the coolers, with yeast and sediment, into an upright cask, with the cover off, or top head out, at not exceeding 60 degrees of heat; and as soon as you perceive a brown yeast on the surface, draw it off from the yeast and bottoms into a clean cask, which must be kept filled full, and when done working, put in a handful of dry hops, bung it down tight, and stow it in a cool cellar This table beer will be fit to tap in a week, or as soon as fine.

To make table ale.

Mix the first and second worts together, and ferment it, and treat it the same as the ale.

To brew porter, or brown beer, with table beer after, from the same malt and hops.

Use pale and brown malt in equal quantities, ground coarse, and strong brown coloured hops of a glutinous quality. If the beer is for present draught, three quarters of a pound of hops to each bushel of malt will be sufficient, but if intended for store beer, use one pound to each bushel of malt.

The process of brewing is the same as described for brewing ale, with table beer after, except the heat of each mash must not be so high by 10 degress, on account of the brown malt; the first wort fomented by itself will be stout porter, and fit to tap in three or four weeks; the second wort will be the table beer, and fit to tap in a week, or as soon as fine; but if you mix the first and second worts together, the same as for table ale, it will be good common porter.

To brew table beer only.

Let the malt be of one sort, of a full yellow colour (not brown malt,) ground coarse, and strong brown coloured hops, of a glutinous quality. If for present draught, half a pound of hops to each bushel of malt will be sufficient; but if for keeping two or three months, use one pound of hops per bushel.

The process of brewing is the same as described for brewing porter and table beer, with the addition of another wort; that is, filling the machine a third time with water before you take out the grains, and treating the third mash the same as the second.

The first drawing off, or wort, with part of the second wort, to be boiled (first) one hour with all the hops, and the remainder of the second wort with the third, to be boiled next one hour to the same hops; these two boilings, when cooled down to 60 degrees of heat, (having put your yeast to it in the coolers at 70 degrees,) must be put together to ferment in the machine boiler, and as soon as it has the appearance of a brown yeast on the surface, draw it off into the casks, which must be kept filled full; and when done working, put into each cask a handful of dry hops, bung it down tight, and put it into a cooler cellar. Tap in a week, or as soon as fine.

This machine may be had from 8*l.* to 55*l.*, and sets of coolers from 2*l.* to 31*l.*

To make sugar beer.

Very excellent beer is made of sugar, and also of treacle. First boil a peck of bran in 10 gallons of water; strain the bran off, and mix with the branny water three pounds of sugar, first stirring it well; when cool enough, add a tea-cupful of the best yeast, and a table-spoonful of flour to a bowl nearly full of the saccharine matter, which, when it has fermented for about an hour, is to be mixed with the remainder and hopped with about half a pound of hops, and the following day, it may be put into the cask, to ferment further, which usually takes up three days, when it is to be bunged, and it will be fit for drinking in a week. Treacle beer is made in the same way, three pounds of it being used instead of three pounds of sugar.

N. B. This beer will not keep any length of time.

Bran beer.

Good fresh table beer may be made with sound wheat bran, at the rate of 2*d.* per gallon, beer measure, estimating the price of bran at 4*s.* per cwt., and the saccharine density of the wort extracted, at 16 lbs. per barrel; but the use of the instrument called saccharometer, in domestic practice, is not necessary, the process in brewing with wheat bran being sufficiently known to every good housewife, especially to those of labourers in husbandry, as well as that for this purpose nothing of apparatus is needful, but such as ought to be in common use with every cottager in the country. A few pounds per barrel of treacle, or the coarsest Muscovado sugar, would be a cheap improvement as to strength, which, indeed, might be increased to any degree required.

Yorkshire oat ale.

Grind a quart of oat malt, made with the white sort, and dried with coke, and mash with forty-four gallons of cold soft water, let it stand twelve hours; then allow it to spend in a fine small stream, and put two pounds of fine pale hops, well rubbed between the hands, into it; let it infuse, cold, for three hours, then strain and tun it; put yeast to it, and it will work briskly for about two days; then stop it up, and in ten days it will be fit to bottle. It drinks very smooth, brisk and pleasant, and looks like white wine, but will not keep.

Cheap beer.

Pour ten gallons of boiling water upon 1 peck of malt in a tub, stir it about well with a stick, let it stand about half an hour, and then draw off the wort; pour 10 gallons more of boiling water upon the malt, letting it remain another half hour, stirring it occasionally, then draw it off and put it to the former wort: when this is done, mix four ounces of hops with it, and boil it well; then strain the hops from it, and when the wort becomes milk-warm, put some yeast to it to make it ferment: when the fermentation is nearly over, put the liquor into a cask, and as soon as the fermentation has perfectly subsided, bung it close down—the beer is then fit for use.

To make beer and ale from pea shells.

No production of this country abounds so much with vegetable saccharine matter as the shells of green peas. A strong decoction of them so much resembles, in odour and taste, an infusion of malt (termed wort) as to deceive a brewer. This decoction rendered slightly bitter with the wood-sage, and afterwards fermented with yeast, affords a very excellent beverage. The method employed is as follows:

Fill a boiler with the green shells of peas, pour on water till it rises half an inch above the shells, and simmer for three hours. Strain off the liquor, and add a strong decoction of the wood-sage, or the hop, so as to render it pleasantly bitter; then ferment in the usual manner. The wood-sage is the best substitute for hops, and being free from any anodyne property, is entitled to a preference. By boiling a fresh quantity of shells in the decoction before it becomes cold, it may be so thoroughly impregnated with saccharine matter, as to afford a liquor, when fermented, as strong as ale.

Required time for keeping beer.

This depends on the temperature at which the malt has been made, as under.

Malt made at 119 degrees will produce beer which may be drawn in a fortnight—at 124 deg. in a month—at 129 deg. in 3 do.—at 134 deg. in 4 do.—at 138 deg. in 6 do.—at 143 deg. in 8 do.—at 148 deg. in 10 do.—at 152 deg. in 15 do.—at 157 deg. in 20 do.—at 162 deg. in 24 do.

To give any required brightness or colour to beer.

This depends on the temperature at which the malt has been made, and on its colour as under:

Malt made at 119 degrees produces a white,—at 124 deg. a cream colour,—at 129 deg. a light yellow,—at 134 deg. an amber colour.

These, when properly brewed, become spontaneously fine, even as far as 138 degrees. When brewed for amber by repeated fermentations, they become pellucid.—At 138 degrees, a high amber.—At 143 degrees, a pale brown.

By precipitation, these grow bright in a short time.—At 148 deg. a brown—At 152 deg. a high brown.

With precipitation these require 8 or 10 months to be bright.—At 157 deg. a brown, inclining to black.—At 162 deg. a brown speckled with black.

With precipitation these may be fined, but will never become bright.—At 167 deg. a blackish brown speckled with black.—At 171, a colour of burnt coffee.—At 176, a black.

These with difficulty can be brewed without setting the goods, and will by no means become bright, not even with the strongest acid menstruum.

To brew amber beer.

Amber is now out of fashion, but formerly was drank in great quantities, in London, mixed with bitters, and called purl. The proportions of malt were 3 quarters amber, and 1 quarter pale, with 6 pounds of hops to the quarter. The first liquor is usually tunned at 170 degrees, and the second at 185 degrees. The worts are boiled together for two hours. It is tunned at 64 degrees, and after 24 hours roused every 2 hours, till the heat is increased to 74. It is then skimmed every hour for 6 hours and cleansed, and generally used as soon as it has done working in the barrels.

Another method of brewing amber beer, or twopenny.

For 36 gallons: malt, 1 bushel and a half, hops, 1 pound, liquorice root, 1 pound, 8 oz. treacle, 5 pounds, Spanish liquorice, 2 oz. capsicum, 2 drachms; frequently drank the week after it is brewed; used in cold weather as a stimulant.

To make molassses beer.

For small beer, put nine pounds of molasses into a barrel-copper of cold water, first mixing it well, and boiling it briskly, with a quarter of a pound of hops or more, one hour, so that it may come off 27 gallons.

To fine beer.

To fine beer, should it be requisite, take an ounce of isinglass, cut small, and boil it in three quarts of beer, till completely dissolved; let it stand till quite cold, then put it into a cask, and stir it well with a stick or whisk; the beer so fined should be tapped soon, because the isinglass is apt to make it flat as well as fine.

Another method.

Take a handful of salt, and the same quantity of chalk scraped fine and well dried; then take some isinglass, and dissolve it in some stale beer till it is about the consistence of syrup: strain it, and add about a quart to the salt and chalk, with two quarts of molasses. Mix them all well together, with a gallon of the beer, which must be drawn off; then put it into the cask, and take a stick or whisk, and stir it well till it ferments. When it has subsided, stop it up close, and in two days it may be tapped. This is sufficient for a butt.

Another.

Take a pint of water, and half an ounce of unslaked lime, mix them well together, letting the mixture stand for three hours, that the lime may settle at the bottom. Then pour off the clear liquor, and mix with it half an ounce of isinglass, cut small and boiled in a little water, pour it into the barrel, and in five or six hours the beer will become fine.

Another method.

In general, it will become sufficiently fine by keeping; but fineness may be promoted by putting a handful of scalded hops into the cask. If the beer continues thick, it may then be fined by putting a pint of the following preparation into the barrel.

Put as much isinglass into a vessel as will occupy one third; then fill it up with old beer. When dissolved, rub it through a sieve, and reduce it to the consistency of treacle with more beer. A pint of this put into the cask and gently stirred with a short stick, will fine the barrel in a few hours.

To fine cloudy beer.

Rack off the cask, and boil one pound of new hops in water, with coarse sugar, and when cold, put in at the bung-hole.

Or, new hops soaked in beer, and squeezed, may be put into the cask.

Or, take 10 pounds of baked pebblestone powder, with the whites of six eggs, and some powdered bay-salt, and mix them with 2 gallons of the beer. Pour in the whole into the casks, and in three or four days it will settle, and the beer be fine and agreeable.

To recover thick, sour malt liquor.

Make strong hop tea with boiling water and salt of tartar, and pour it into the cask.

Or, rack the cask, into two casks of equal size, and fill them up with new beer.

To vamp malt liquors.

Old beer may be renewed by racking one cask into two, and filling them from a new brewing, and in three weeks it will be a fine article.

To restore musty beer.

Run it through some hops that have been boiled in strong wort, and afterwards work it with double the quantity of new malt liquor: or if the fault is in the cask, draw it off into a sweet cask, and having boiled half a pound of brown sugar in a quart of water, add a spoonful or two of yeast before it is quite cold, and when the mixture ferments, pour it into the cask.

To enliven and restore dead beer.

Boil some water and sugar, or water and treacle, together, and when cold, add some new yeast; this will restore dead beer, or ripened bottled beer in 24 hours; and it will also make worts work in the tun, if they are sluggish.

Or, a small tea-spoonful of carbonate of soda may be mixed with a quart of it, as it is drawn for drinking.

Or, boil for every gallon of the liquor 3 oz. of sugar in water; when cold add a little yeast, and put the fermenting mixture into the flat beer, whether it be a full cask or the bottom of the cask.

Or, beer may often be restored, which has become flat or stale, by rolling and shaking the casks for a considerable time, which will create such a new fermentation as to render it necessary to open a vent-peg to prevent the cask from bursting.

A speedy way of fining and preserving a cask of ale, or beer.

Take a handful of the hops boiled in the first wort, and dried, half a pound of loaf sugar, dissolved in the beer, 1 pound of chalk, and half a pound of calcined oyster-shells. Put the whole in at the bung-hole, stirring them well and then re-bunging. This preparation will also suit for racked beer; in putting in the hops it may be advisable to place them in a net with a small stone in the bottom so as to sink them, otherwise they will swim at the top.

Improvement in brewing.

It appears by the Monthly Magazine of July 1, 1823, that the process of fermentation, so important to the brewers and distillers, and others of this country, is destined to undergo a very important change, in consequence of a discovery made in France, whereby the practicability and advantage of fermenting worts in close vessels has been fully established. Instead of using broad and open vats, exposed fully to the atmospheric air, which was formerly thought essential to the first and principal process of fermenting worts, a quantity of alcohol, mixed with the aroma or flavouring principle of the wort, from 4 1-2 to 5 per cent. of the whole spirit which the wort is capable of yielding, after rising in vapour along with the carbonic gas, is condensed and returned again into the wort, from a kind of alembic, fixed on the close top of the fermenting tun, and connecting therewith only by means of pipes.

Messrs. Gray and Dacre, in their brewery at West-Ham, in Essex, have adopted this new mode of fermenting their wort, and the success attending it is most complete. One essential advantage attending the use of a close vessel for fermenting, is the being able to preserve a more equable temperature in the wort, whereby neither the heat of summer nor the cold of winter are able to interrupt or frustrate the process of complete fermentation. The exclusion of the oxygen of the atmospheric air, by the same means, from cider, perry, or British wines, whilst under the process of fermentation, seems to promise a still greater improvement of the process than has attended the use of this invention in the fermenting of wines on the continent.

To recover beer when flat.

Take four or five gallons out of a hogshead, boil it with four or five pounds of honey; skim it well when cold, and put it into the cask again—then stop it up close, and it will make the liquor drink strong and pleasant.

Another method.

Take two ounces of new hops, and a pound of chalk broken into several pieces—put them into the cask, and bung it up close. In three days it will be fit to drink. This is the proper quantity for a kilderkin.

Another method.

Take a fine net, and put in it about a pound of hops, with a stone or something heavy to sink it to the bottom of the cask. This is sufficient for a butt—but if the cask be less, use the hops in proportion. Tap it in six months: or, if wanted sooner, put in some hops that have been boiled a short time in the first wort, either with or without a net.

To prevent beer becoming stale and flat.

First method.

To a quart of French brandy put as much wheat or bean flour as will make it into a dough, and put it in, in long pieces, at the bung-hole, letting it fall gently to the bottom. This will prevent the beer growing stale, keep it in a mellow state, and increase its strength.

Second method.

To a pound of treacle or honey, add a pound of the powder of dried oyster shells, or of soft mellow chalk—mix these into a stiff paste, and put it into the butt. This will preserve the beer in a soft and mellow state for a long time.

Third method.

Dry a peck of egg shells in an oven—break and mix them with two pounds of soft mellow chalk, and then add some water wherein four pounds of coarse sugar have been boiled and put it into the cask. This will be enough for a butt.

Fourth method.

In a cask, containing eighteen gallons of beer put a pint of ground malt, suspended in a bag and close the bung perfectly; the beer will be improved during the whole time of drawing it for use.

Make use of any of these receipts most approved of, observing that the paste or dough must be put into the cask when the beer has done working, or soon after, and bunged down. At the end of nine or twelve months tap it, and you will have a fine, generous, wholesome, and agreeable liquor.

When the great quantity of sediment that lies at the bottom of the cask is neglected to be cleaned, this compound of malt, hops, and yeast, so affects the beer, that it partakes of all their corrosive qualities, which render it prejudicial to health, generating various chronical and acute diseases. On this account, during the whole process of brewing, do not allow the least sediment to mix with the wort in removing it from one tub or cooler to the other; especially be careful when tunning it into the cask, not to disturb the bottom of the working tub, which would prevent its ever being clear and fine. Again, by keeping it too long in the working tub, persons who make a profit of the yeast frequently promote an undue fermentation, and keep it constantly in that state for five or six days: which causes all the spirit that should keep the beer soft and mellow to evaporate, and it will certainly get stale and hard, unless it has something wholesome to feed on.

It is the practice of some persons to beat in the yeast, while the beer is working, for several days together, to make it strong and heady, and to promote its sale. This is a wicked and pernicious custom. Yeast is of a very acrimonious and narcotic quality, and when beat in for several days together, the beer thoroughly imbibes its hurtful qualities. It is not discoverable to the taste, but is very intoxicating, and injures the whole nervous system, producing debility and all its consequences. Therefore, let the wort have a free, natural, and light fermentation, and one day in the working tub will be long enough during cold weather; but turn it the second day at the furthest, throw out the whole brewing, and afterwards introduce no improper ingredients.

To prevent and cure foxing in malt liquors.

Foxing, sometimes called bucking, is a disease of malt fermentation which taints the beer. It arises from dirty utensils; putting separate worts together in vessels not too deep; using bad malt; by turning on the liquor at too great heats, and brewing in too hot weather. It renders the beer ropy and viscid, like treacle, and it soon turns sour. When there is danger of foxing, a handful of hops should be thrown into the raw worts while they are drawn off, and before they are boiled, as foxing generally takes place, when, from a scantiness of utensils, the worts are obliged to be kept some time before they are boiled. When there is a want of shallow coolers, it is a good precaution to put some fresh hops into the worts, and work them with the yeast. If the brewing foxes in the tun while working, hops should then be put into it, and they will tend to restore it, and extra care ought to be taken to prevent the lees being transferred to the barrels.

Some persons sift quick-lime into the tun when the brewing appears to be foxed. If care is not taken to cleanse and scald the vessels after foxing, subsequent brewings may become tainted.

Other methods of curing foxing.

Cut a handful of hyssop small; mix it with a handful of salt, and put it into the cask. Stir and stop close.

Or, infuse a handful of hops, and a little salt of tartar in boiling water; when cold, strain the liquor off, and pour it into the cask, which stop close.

Or, mix an ounce of alum, with 2 oz. of mustard-seed, and 1 oz. of ginger; stir them in the sack, and stop close.

Or, in a fortnight, rack off the foxed beer, and hang 2 lbs. of bruised Malaga raisins in a bag within the cask, and put in a mixture of treacle, bean-flour, mustard-seed, and powdered alum.

To restore a barrel of ropy beer.

Mix a handful of bean-flour with a handful of salt, and stir it in at the bung-hole: or take some well infused hops, and mix them in with some settlings of strong wort, and stir the mixture in at the bung-hole. Or, powder half an ounce of alum very fine, and mix with a handful of bean-flour.

To restore a barrel of stale, or sour beer.

Put a quarter of a pound of good hops, and two pounds of sound chalk into the bung-hole; stop it close, and in a few days it will draw perfectly fresh. Or, a small tea-spoonful of carbonate of soda may be mixed with every quart as it is drank.

To make a butt of porter, stout.

Insert 4 gallons of molasses and some finings; stir it well. In a week draw off the cask by a cock inserted half way down.

To restore frosted beer.

Such beer is usually sweet and foul, and will never recover of itself; but to remedy this, make a pailful of fresh wort, into which put a handful of rubbed hops, and boil them half an hour, so that it may be very bitter, and when almost cold, draw a pailful from the cask, and re-fill it with the bitter wort. Fermentation will re-commence, but when this is over, bung it up for a month. If it is not then restored, rack it into another cask, and put into it 1-2 a peck of parched wheat, and 1 lb. of good hops, dried and rubbed, and tied up in a net. Bung it down, leaving the vent-hole open for a day or two, and in a month it will be fine liquor.

To give new ale the flavour of old.

Take out the bung, and put into the cask, a handful of pickled cucumbers; or a sliced Seville orange, and either mode will add an apparent six months to the age of the ale.

To protect malt liquors against the effects of electricity.

As positive electricity is nothing more than oxygenous gas which, when accumulated in conductors by electrical action, affects all fluids (as conductors,) and enclosed fermented liquors among the rest, and as electrical action always takes place among the best conductors, so fermented liquors, whether in casks or bottles, may be protected from electrical action (vulgarly called thunder) by placing on the casks, or over the bottles, pieces, or rods of iron; and such have been found, by experience, to serve as a sufficient protection against this pernicious influence.

To give beer a rich flavour.

Put six sea-biscuits into a bag of hops, and put them into the cask.

To preserve brewing utensils.

In cleaning them before being put away, avoid the use of soap, or any greasy material, and use only a brush and scalding water, being particularly careful not to leave any yeast or fur on the sides.

To prevent their being tainted, take wood ashes and boil them to a strong ley, which spread over the bottom of the vessels scalding, and then with the broom scrub the sides and other parts.

Or, take bay-salt and spread it over the coolers, and strew some on their wet sides, turning in scalding water and scrubbing with a broom.

Or, throw some stone-lime into water in the vessel, and scrub over the bottom and sides, washing afterwards with clean water.

To sweeten stinking or musty casks.

Make a strong ley of ash, beech, or other hard wood-ashes, and pour it, boiling hot, into the bung-hole, repeating it as often as there is occasion.

Or, fill the cask with boiling water, and then put into it, some pieces of unslaked stone-lime, keeping up the ebullition for half an hour. Then bung it down, and let it remain until almost cold, when turn it out.

Or, mix bay salt with boiling water, and pour it into the cask, which bung down, and leave it to soak.

Or, if the copper be provided with a dome, and a steam pipe from its top, pass the steam into the casks.

Or, unhead the cask, scrub it out, head it again; put some powdered charcoal into the bung-hole, and two quarts of a mixture of oil of vitriol and cold water. Then bung it tight, and roll and turn the cask for some time. Afterwards wash it well, and drain it dry.

Or, take out the head, and brush the inside with oil of vitriol, afterwards wash it, then burn a slip of brown paper steeped in brimstone within the bung-hole, and stop it close for two hours, when it should be well washed with hot water.

Another method.

Mix half a pint of the sulphuric acid (not the diluted) in an open vessel, with a quart of water, and whilst warm, put it into the cask, and roll it about in such a manner that the whole internal surface may be exposed to its action. The following day, add about one pound of chalk, and bung it up for three or four days, when it may be washed out with boiling water. By this process, a very musty cask may be rendered sweet.

For sweetening musty bottles, it will be only necessary to rinse the inside with the diluted sulphuric acid in the above mentioned proportions. The addition of chalk, if it were immediately corked, would burst the bottle, and if the cask be old, it would be advisable to let a little of the gas escape before bunging it.

Another.

Collect fresh cow dung and dilute it with water, in which four pounds of salt and one of common alum are dissolved. Let these be boiled together, and poured hot into the barrel, which must then be bunged and well shaken. This operation should be performed several times, taking care to rinse the cask out every time, with clean water.

Another.

If a cask, after the beer is drank out, be well stopped, to keep out the air, and the lees be suffered to remain in it till used again, scald it well, taking care that the hoops be well driven on, before filling; but should the air get into an empty cask, it will contract an ill scent, notwithstanding the scalding; in which case a handful of bruised pepper, boiled in the water, will remove it, though the surest way is to take out the head of the cask; that it may be shaved, then burn it a little, and scald it for use; if this cannot be conveniently done, get some lime-stone, put about three pounds into a barrel, (and in same proportion for larger or smaller vessels.) Put to it about six gallons of cold water, bung it up, shake it about for some time, and afterwards scald it well. Or, in lieu of lime, match it well and scald it. Then the smell will be entirely removed. If the casks be new, dig holes in the earth, and lay them in, to about half their depth, with their bung-holes downwards, for a week. After which scald them well, and they will be ready for use.

Another.

The process of charring fails only in the fire not being able to penetrate into the chasms or chinks of the cask, into which the coopers (to mend bad work) often insert strips of paper, or other substance, to make it water-tight, which in time become rotten and offensive; in order to remedy this, put into a cask containing a quantity of water (say about 2 gallons in a hogshead) 1-10th of its weight of sulphuric acid (oil of vitriol), and let this be shook for some time; this is to be poured out, the cask well washed, and then rinsed with a few gallons of lime-water. It is needless to say, that it ought likewise to be washed out.

Sulphur mixed with a little nitre, burnt in a close vessel, and then the subsequent process of lime-water, &c. would do, and perhaps as well.

The theory is, that sulphuric acid has the property, when used alone, of charring wood, and when diluted, has sufficient strength to destroy must, &c. with the additional advantage of entering into every crevice. The lime in solution seizes any particle of acid which the first washing might leave, and converts it into an insoluble inoffensive neutral salt, such as, if left in the cask, would not in the least injure the most delicate liquor.

London coopers' mode of sweetening casks.

It is their system to take out the head, place the cask over a brisk fire, and char the inside completely. The head is then put in again, and the cask, before used, is filled two or three times with hot liquor, bunged down and well shook, before it is used again.

Method of seasoning new casks.

Put the staves just cut and shaped, before they are worked into vessels, loose in a copper of cold water, and let them heat gradually so that they must be well boiled, and in boiling take out a hand-bowl of water at a time, putting in fresh till all the redness is out of the liquor, and it become clear from a scum of filth that will arise from the sap so boiled out; also take care to turn the staves upside down, that all their parts may equally have the benefit of the hot water. Observe also that in a dry, sultry summer, the sap is more strongly retained in the wood, than in a cool and moist one, and therefore must have the more boiling. Then, when the vessel is made, scald it twice with water and salt boiled together, and it may be readily filled with strong beer without fearing any twang from the wood.

To keep empty vessels sweet.

An eminent London brewer is so curious in this respect, that he makes use of a wooden bung, which, as soon as he has put into the vessel with some brown paper, he directly covers over with some wood ashes mixed with water, and puts it all about the same, with as much care as if the cask had been full of strong beer, though it is done only to keep the grounds sweet while they are so. And thus a vessel may be preserved in sound order for nearly half a year.

Fermentation by various means.

As yeast is nothing more than fixed air combined with mucilage thrown to the top, during fermentation, and the use of yeast consists merely in diffusing, by its means, fixed air through the mixture to be fermented; so whatever contains fixed air which can be communicated through the mass, will cause good fermentation, whether it be in brewing or bread making. Thus chemists have impregnated infusions with gas by an apparatus, and produced good beer, and a bottle, containing calcareous matter and oil of vitriol, immersed in the fluid, has caused effectual fermentation, and produced all its results.

First substitute for yeast.

Mix two quarts of water with wheat flour, to the consistence of thick gruel, boil it gently for half an hour, and when almost cold, stir into it half a pound of sugar and four spoonsful of good yeast. Put the whole into a large jug, or earthen vessel with a narrow top, and place it before the fire, so that it may by a moderate heat ferment. The fermentation will throw up a thin liquor, which pour off and throw away; keep the remainder for use (in a cool place) in a bottle, or jug tied over. The same quantity of this, as of common yeast, will suffice to bake or brew with. Four spoonsful of this yeast will make a fresh quantity as before, and the stock may be always kept up, by fermenting the new with the remainder of the former quantity.

Second substitute.—Take six quarts of soft water and two handsful of wheaten meal or barley; stir the latter in the water before the mixture is placed over the fire, where it must boil till two thirds are evaporated. When this decoction becomes cool, incorporate with it, by means of a whisk, two drachms of salt of tartar, and one drachm of cream of tartar, previously mixed. The whole should be kept in a warm place. Thus a very strong yeast for brewing, distilling, and baking, may be obtained. For the last mentioned purpose, however, it ought to be diluted with pure water, and passed through a sieve, before it is kneaded with the dough, in order to deprive it of its alkaline taste.

In countries where yeast is scarce, it is a common practice to twist hazel twigs so as to be full of chinks, and then to steep them in ale-yeast during fermentation. The twigs are then hung up to dry, and at the next brewing they are put into the wort instead of yeast. In Italy the chips are frequently put into turbid wine, for the purpose of clearing it, this is effected in about twenty-four hours.

Third substitute.—Take one pound of fine flour, make it the thickness of gruel with boiling water, add to it half a pound of raw sugar. Mix them well together. Put three spoonsful of well purified yeast into a large vessel, upon which put the above ingredients, they will soon ferment violently. Collect the yeast off the top and put it into a brown small-neck pot, and cover it up from the air, keep it in a dry and warmish place, when used in part, replace with flour made into a thin paste, and sugar in the former proportions, the above will be fit for use in five months, and no yeast is necessary except the first time.

Fourth substitute.—Boil flour and water to the consistence of treacle, and when the mixture is cold, saturate it with fixed air. Pour the mixture, thus saturated, into one or more large bottles or narrow mouthed jars; cover it over loosely with paper, and upon that lay a slate or board with a weight to keep it steady. Place the vessel in a situation where the thermometer will stand from 70 deg. to 80 deg. and stir up the mixture two or three times in the course of 24 hours. In about two days, such a degree of fermentation will have taken place, as to give the mixture the appearance of yeast. With the yeast in this state, and before it has acquired a thoroughly vinous smell, mix the quantity of flour intended for bread, in the proportion of six pounds of flour to a quart of the yeast, and a sufficient portion of warm water. Knead them well together in a proper vessel, and covering it with a cloth, let the dough stand for twelve hours, or till it appears to be sufficiently fermented in the forementioned degree of warmth. It is then to be formed into loaves and baked. The yeast would be more perfect if a decoction of malt were used instead of simple water.

Fifth substitute.—A decoction of malt alone, without any addition, will produce a yeast proper enough for the purpose of brewing. This discovery was made by Joseph Senyor, and he received for it a reward of 20*l.* from the Society for Promoting Arts, Manufactures, and Commerce. The process is as follows; Procure three earthen or wooden vessels of different sizes and apertures, one capable of holding two quarts, the other three or four, and the third five or six: boil a quarter of a peck of malt for about eight or ten minutes in three pints of water; and when a quart is poured off from the grains, let it stand in the first or smaller vessel in a cool place till not quite cold, but retaining that degree of heat which the brewers usually find to be proper when they begin to work their liquor. Then remove the vessel into some warm situation near a fire, where the thermometer stands between 70 and 80 deg. of Fahrenheit, and there let it remain till the fermentation begins, which will be plainly perceived within 30 hours; add then two quarts more of a like decoction of malt, when cool, as the first was, and mix the whole in the second or larger vessel, and stir it well in, which must be repeated in the usual way, as it rises in a common vat: then add a still greater quantity of the same decoction, to be worked in the largest vessel, which will produce yeast enough for a brewing of 40 gallons.

Sixth substitute.—Boil one pound of good flour a quarter of a pound of brown sugar, and a little salt, in two gallons of water for one hour; when milk-warm, bottle it and cork it close: it will be fit for use in twenty-four hours. One pint of this will make 18 lbs. of bread.

Seventh substitute.—To a pound of mashed potatoes (mealy ones are best) add two ounces of brown sugar, and two spoonsful of common yeast; the potatoes first to be pulped through a cullender, and mixed with warm water to a proper consistence. Thus a pound of potatoes will make a quart of good yeast. Keep it moderately warm while fermenting.

Eighth substitute.—Infuse malt, and boil it as for beer; in the mean time, soak isinglass, separated to fibres, in small beer. Proportion the quantity of each, 1 ounce of isinglass to two quarts of beer. This would suffice for a hogshead of boiling, wort and the proportion may be diminished or increased accordingly. After soaking five minutes, set the beer and isinglass on the fire, stirring till it nearly boils. Then turn it into a dish that will allow beating it up with a syllabub whisk, to the consistence of yeast, and when almost cold, put it to the wort.

Ninth substitute.—Make a wort of the consistence of water gruel, with either rye or malt, ground very fine; put 5 gallons of it into a vessel capable of holding a few gallons more; dissolve 1 pound of leaven in a small portion of the wort, and add it to the remainder with 2 1-4 pounds of fine ground malt; mix the whole by agitation, for some minutes, and in half an hour add two large spoonsful of good yeast; incorporate it thoroughly with the mass, cover it close and let it remain undisturbed for forty-eight hours in a moderate temperature; at the end of that period it will be found to be wholly converted into good yeast. It is requisite that the rye and malt should be fine, and the leaven completely dissolved before being put to the remaining wort, which, previous to the yeast being added, should be at about 100 degrees Fahrenheit.—*Transactions of the Economical Society of Petersburgh.*

To preserve yeast.

Common ale yeast may be kept fresh and fit for use several months by the following method: Put a quantity of it into a close canvas bag, and gently squeeze out the moisture in a screw-press till the remaining matter be as firm and stiff as clay. In this state it may be close packed up in a tight cask for securing it from the air; and will keep fresh, sound, and fit for use, for a long time. This is a secret that might be of great use to the brewers and distillers, who, though they employ very large quantities of yeast, seem to know no method of preserving it or raising nurseries of it; for want of which they sustain a very considerable loss; whereas the brewers in Flanders make a very great advantage of supplying the malt distillers of Holland with yeast, which is rendered lasting and fit for carriage by this easy expedient.

Another method.

Stir a quantity of yeast and work it well with a whisk, till it seems liquid and thin. Then get a large wooden dish or tub, clean and dry, and with a soft brush lay on a thin layer of yeast thereon, turning the mouth downwards, to prevent its getting dust, but so that the air may come to it to dry it. When that coat or crust is sufficiently dried, lay on another, which serve in the same manner, and continue putting on others as they dry, till two or three inches thick, which will be useful on many occasions. But be sure the yeast in the vessel be dry before more be laid on. When wanted for use, cut a piece out, lay it in warm water, stir it together, and it will be fit for use. If for brewing, take a handful of birch tied together, dip it into the yeast, and hang it to dry, taking care to keep it free from dust. When the beer is fit to set to work, throw in one of these, and it will work as well as fresh yeast. Whip it about in the wort and then let it lie. When the beer works well, take out the broom, dry it again, and it will do for the next brewing.

To restore bad yeast.

Mix with it a little flour, sugar, salt, brandy, and beer, and these will confer on it the qualities of good yeast. Good yeast may also be made by adding the same mixture to the grounds of ale.

To make purl bitters.

Take of Roman wormwood two dozen pounds, gentian root six pounds, calamus aromaticus (or the sweet flag root) two pounds, snake root one pound, horse radish one bunch, orange peel dried, and juniper berries, each two pounds, seeds or kernels of Seville oranges cleaned and dried, two pounds. Cut these, and bruise them, and put them into a clean butt, and start some mild brown or pale beer upon them, so as to fill up the vessel, about the beginning of November, which let stand till the next season. If a pound or two of galanga root is added to it, the composition will be better.

Cautions in the use of foreign ingredients.

In general, the beer should be racked off first, because the sediments and lees will not accord with the foreign substances.—Salt and alum in two large quantities induce staleness. The powder of soft stone, unburnt, should be avoided; too many whites of eggs are apt to make the beer ropy. The introduction of *coculus indicus* confers a pernicious strength or headiness, which gratifies drunkards, but destroys the nervous system, and produces palsies and premature old age. It has been well remarked, that the brewer that uses this slow, but certain poison, as a substitute for a due quantity of malt, ought to be boiled in his own copper.

Bitters are in like manner pernicious in many states of the stomach. When oyster shells are used, the bung should be left out to avoid bursting.

Use of sugar in brewing.

Families brewing their own malt liquor may use thirty-two pounds of brown sugar with two bushels of malt, which will produce 50 gallons of ale, as good in every respect as if made from six bushels of malt, effecting a saving of 31*s*. 8*d*. The sugar is mixed with the wort as it runs from the mash-tub.

To close casks without bungs.

Some persons cover the bung hole simply with brown paper, fastened at the sides, and covered with clay, others have found a single piece of bladder, well fixed at the edges, a complete and efficacious substitute for bungs. These methods at least prevent the bursting of the cask from changes of air.

To bottle porter, ale, &c.

In the first place, the bottles should be clean, sweet, and dry, the corks sound and good, and the porter or ale fine. When the bottles are filled, if for home consumption, they should not be corked till the day following: and if for exportation to a hot climate, they must stand three days or more, (if the liquor is new) —it should be well corked and wired, but for a private family they may do without wiring, only they should be well packed in sawdust, and stand upright. But if some ripe are wanted keep a few packed on their sides, so that the liquor may touch the corks—and this will soon ripen, and make it fit for drinking.

To ripen porter and ale, if flat when bottled.

When about to fill the bottles, put into each of them a tea-spoonful of raw brown sugar—or two tea-spoonsful of rice wheat—or six raisins.

To remove tartness.

Put a tea-spoonful of carbonate of soda into a quart of tart beer, and it will be pleasant and wholesome.

To bottle malt liquor.

It should be ripe, and not too young. Cork loose at first, and afterwards firm. For a day or two, keep the bottles in cold water, or in a cold place; or throw some cold water over them. Steep the corks in scalding water, to make them more elastic. Lay the bottles on their sides. When it is desired that the liquor should ripen soon, keep the bottles in a warmer place. October beer should not be bottled till Midsummer; nor March beer till Christmas. If the ale is flat, or stale, put 3 horse-beans, or 3 raisins into each bottle, and to prevent the bottles bursting, make a hole in the middle of the cork with an awl; or put into each bottle, one or two pepper corns. If it is desired to ripen it quick, boil some coarse sugar in water, and when cold, ferment it with yeast. Then put 3 or 4 spoonsful of it, with two cloves, and if kept in a warm place, it will be ripe the next day. When the ale is sour, put into it a little syrup of capillaire, and ferment it with yeast; when settled, bottle it, and put a clove or two with a small lump of sugar into each bottle. It is also useful to put 2 or 3 pieces of chalk, or some powdered chalk, into the barrel before bottling.

To bottle table beer.

As soon as a cask of table beer is received into the house, it is drawn off into quart *stone* bottles, with a lump of white sugar in each, and securely corked. In three days it becomes brisk, is equal in strength to table ale, remarkably pleasant, very wholesome, and will keep many months.

To render bottled beer ripe.

The following method is employed in Paris, by some venders of bottled beer, to render it what they term ripe.—It is merely by adding to each bottle 3 or 4 drops of yeast, and a lump of sugar, of the size of a large nutmeg. In the course of twenty-four hours, by this addition, stale or flat beer is rendered most agreeably brisk. In consequence of the fermentative process that takes place in it, a small deposit follows, and on this account the bottles should be kept in an erect position. By this means white wine may likewise be rendered brisk.

To manage ale in the cellar.

In general, nothing is more necessary than to keep it well stopped in a cool cellar, looking occasionally to see that there is no leakage, and to open the vent-holes, if any oozings appear between the staves of the stacks: but connoisseurs in malt liquor may adopt some of the following means; leave the cock-hole of an upright cask, or the vent-hole of a horizontal one, open for 2 or 3 months; then rack off into another cask with 1 or 2 pounds of new hops, and closely bung and stop down.

Or, leave the vent-holes open a month; then stop, and about a month before tapping, draw off a little, and mix with it 1 or 2 pounds of new hops, which having poured into the cask, it is again closely stopped.

Or, salt may be used with the hops, as it always gives beer the flavour of age.

To keep hops for future use.

Hops lose all their fine flavour by exposure to the air and damp. They should be kept in a dry close place, and lightly packed.

TO MAKE CIDER.

After the apples are gathered from the trees, they are ground into what is called *pommage*, either by means of a common pressing stone, with a circular trough, or by a cider mill, which is either driven by the hand, or by horse power. When the pulp is thus reduced to a great degree of fineness, it is conveyed to the cider press, where it is formed by pressure into a kind of cake, which is called the *cheese*.

This is effected by placing clear sweet straw, or hair cloths, between the layers of pommage, till there is a pile of ten or twelve layers. The pile is then subjected to different degrees of pressure in succession, till all the *must*, or *juice*, is squeezed from the pommage. This juice after being strained in a coarse hair-sieve, is then put either into open vats or close casks, and the pressed pulp is either thrown away, or made to yield a weak liquor called washings.

After the liquor has undergone the proper fermentation in these close vessels, which may be best effected in a temperature of from forty to sixty degrees of Fahrenheit, and which may be known by its appearing tolerably clear, and having a vinous sharpness upon the tongue, any farther fermentation must be stopped by racking off the pure part into open vessels, exposed for a day or two in a cool situation. After this the liquor must again be put into casks, and kept in a cool place during winter. The proper time for racking may always be known by the brightness of the liquor, the discharge of the fixed air, and the appearance of a thick crust formed of fragments of the reduced pulp. The liquor should always be racked off anew, as often as a hissing noise is heard, or as it extinguishes a candle held to the bung-hole.

When a favourable vinous fermentation has been obtained, nothing more is required than to fill up the vessels every two or three weeks, to supply the waste by fermentation. On the beginning of March, the liquor will be bright and pure, and fit for final racking, which should be done in fair weather. When the bottles are filled, they should be set by uncorked till morning, when the corks must be driven in tightly, secured by wire or twine and melted rosin, or any similar substance.

To make Devonshire cider.

Prefer the bitter sweet apples, mixed with mild sour, in the proportion of one-third. Gather them when ripe, and lay them in heaps in the orchard. Then take them to the crushing engine, made of iron rollers at top and of stone beneath; after passing through which, they are received in large tubs or cives, and are then called pommage. They are afterwards laid on the vat in alternate layers of the pommage and clean straw, called reeds. They are then pressed, the juice running through a hair sieve. After the cider is pressed out, it is put into hogsheads, where it remains for two or three days previously to fermenting. To stop the fermentation, it is drawn off into a clean vessel; but if the fermentation be very strong, two or three cans of cider are put into a clean vessel, and a match of brimstone burnt in it: it is then agitated, by which the fermentation of that quantity is completely stopped. The vessel is then nearly filled, the fermentation of the whole is checked, and the cider becomes fine: but if, on the first operation, the fermentation is not checked, it is repeated till it is so, and continued from time to time till the cider is in a quiet state for drinking.

Some persons instead of deadening a small quantity with a match, as above directed, put from one to two pints of an article called *stum* (bought of the wine coopers) into each hogshead: but the system of racking as often as the fermentation appears, is generally preferred by the cider manufacturers of Devonshire.

About six sacks, or twenty-four bushels of apples, are used for a hogshead of sixty-three gallons. During the process, if the weather is warm, it will be necessary to carry it on in the shade, in the open air, and by every means keep it as cool as possible.

In nine months it will be in condition for bottling or drinking; if it continues thick, use some isinglass finings, and if at any time it ferments and threatens acidity, the cure is to rock it and leave the head and sediment.

Scotch method.

The apples are reduced to mucillage, by beating them in a stone trough (one of those used at pumps for watering horses) with pieces of ash-poles, use in the manner that potatoes are mashed. The press consists of a strong box, three feet square, and twenty inches deep, perforated on each side with small auger or gimlet holes. It is placed on a frame of wood, prejecting three inches beyond the base of the box. A grove is cut in this projection one inch and a half wide, and one inch deep, to convey the juice when pressed out of the box into a receiving pail. This operation is performed in the following manner: The box is filled alternately with strata, of fresh straw and mashed fruit, in the proportion of one inch of straw to two inches of mucilage; these are piled up a foot higher than the top of the box: and care is taken in packing the box itself, to keep the fruit and straw about one inch from the sides of the box, which allows the juice to escape freely. A considerable quantity of the liquor will run off without any pressure. This must be applied graduallv at first, and increased regularly towards the conclusion. A box of the above dimensions will require about two tons weight to render the residuum completely free from juice.

The residuum is excellent food for pigs, and peculiarly acceptable to them.

The necessary pressure is obtained very easily, and in a powerful manner, by the compound lever pressing upon a lid or sink made of wood about two inches thick, and rendered sufficiently strong by two cross-bars. It is made to fit the opening of the box exactly; and as the levers force the lid down, they are occasionally slacked or taken off, and blocks of wood are placed on the top of the lid, to permit the levers to act, even after the lid has entered the box itself. Additional blocks are repeated, until the whole juice is extracted. The pressure may be increased more or less, by adding or diminishing the weight suspended at the extremity of the lever.

The liquor thus obtained is allowed to stand undisturbed twelve hours, in open vessels, to deposit sediment. The pure juice is then put into clean casks, and placed in a proper situation to ferment, the temperature being from fifty-five or sixty degrees. The fermentation will commence sooner or later, depending chiefly on the temperature of the apartment where the liquor is kept; in most cases, during the first three or four days; but sometimes it will require more than a week to begin this process. If the fermentation begins early and proceeds rapidly, the liquor must be racked off, and put into fresh casks in two or three days; but if this does not take place at an early period, and proceeds slowly, five or six days may elapse before it is racked. In general, it is necessary to rack the liquor at least twice. If, notwithstanding, the fermentation continues briskly, the racking must be repeated; otherwise the vinous fermentation, by proceeding too far, may terminate in acetous fermentation, when vinegar would be the result.

In racking off the liquor it is necessary to keep it free of sediment, and the *scum* or yeast produced by the fermentation. A supply of spare liquor must be reserved to fill up the barrels occasionally, while the fermentation continues. As soon as this ceases, the barrels should be bunged up closely, and the bungs covered with rosin, to prevent the admission of air. If the cider is weak, it should remain in the cask about nine months; if strong, twelve or eighteen months is necessary before it should be bottled.—*Farmer's Mag. Vol. IX.*

To manage cider and perry.

To fine and improve the flavour of one hogshead, take a gallon of good French brandy, with half an ounce of cochineal, one pound of alum, and three pounds of sugar-candy; bruise them all well in a mortar, and infuse them in the brandy for a day or two; then mix the whole with the cider, and stop it close for five or six months. After which, if fine, bottle it off.

Cider and perry, when bottled in hot weather, should be left a day or two uncorked, that it may get flat; but if too flat in the cask, and soon wanted for use, put into each bottle a small lump or two of sugar-candy, four or five raisins of the sun, or a small piece of raw beef; any of which, will much improve the liquor, and make it brisker.

Cider should be well corked and waxed, and packed upright in a cool place. A few bottles may always be kept in a warmer place to ripen and be ready for use.

To make cheap cider from raisins.

Take fourteen pounds of raisins with the stalks; wash them out in four or five waters, till the water remains clear: then put them into a clean cask with the head out, and put six gallons of good water upon them; after which cover it well up, and let it stand ten days. Then rack it off into another clean cask, which has a brass cock in it, and in four or five days time it will be fit for bottling. When it has been in the bottles seven or eight days, it will be fit for use. A little colouring should be added when putting into the cask the second time. The raisins may afterwards be used for vinegar.

To make perry.

Perry is made after the same manner as cider, only from pears, which must be quite dry. The best pears for this purpose are such as are least fit for eating, and the redder they are the better.

WINES.

TO MAKE BRITISH WINES.

The different processes in wine making, range themselves under the following heads:

Gathering the fruit, picking the fruit, bruising the fruit, and vatting the fruit.

Vinous fermentation, flavouring the wine, drawing the must, pressing the husk, casking the must.

Spirituous fermentation, racking the wine, fining the wine, bottling and corking the wine.

Gathering the fruit.

Fruit of every sort, says Mr. Carnell, in his excellent treatise on wine making, should be gathered in fine weather; those of the berry kind often appear ripe to the eye before they are really so, therefore it is requisite to taste them several times in order to ascertain that they are arrived at the crisis of maturity. If the fruit be not ripe, the wine will be harsh and hard, unpleasant to the palate, and more so to the stomach; it will also require more spirit and saccharine, and take a longer time to be fit for the table. If the fruit be too ripe, the wine from it will be faint, low, and vapid; it will not be so strong and generous; it will also require more trouble, additional spirit, and expense.

Picking.

Detach the unripe and bad berries: the result, when the wine is drank, will be greatly superior in richness. Pick stalks from grapes, currants, and gooseberries, previously to their being placed in the vat.

Bruising.

The quantity of fruit for making a vintage of domestic wine, is not so large but it may be bruised in a tub, and from thence removed into the vat, or if the quantity be very small, it may be bruised in the vat. While the fruit is picking by one person, another may bruise it, and as it is bruised remove it into the vat. When Malaga or Smyrna raisins are used, they are to be put into the vat with the water, to soak, and the following day taken out and bruised, then returned into the vat again.

Vatting.

The first thing to be done is to place the guard against the tap-hole, to prevent the husks escaping at the time the must or extract is drawn off. When all the fruit is in the vat the water should be added, and the contents stirred with the vat-staff, and left to macerate until the next day, when sugar, tartar, &c. diluted with some of the liquor, is to be put into the vat, and the whole again stirred up. The place where the vat is situated should have a free circulation of air, and a temperature of not less than 58 degrees. If the vinous fermentation do not take place, in a reasonable time, the contents must be often stirred, and the place made warmer.

Vinous fermentation.

The time of a vinous fermentation commencing is always uncertain; it depends much on the quality and quantity of the contents of the vat, on its local situation, on the season or weather, and most particularly on the greenness or ripeness of the fruit. To produce a medium vinous fermentation, the vats and contents ought to be placed in a temperature from 60 to 70 degrees. And if this is found not to produce fermentation in a short time, the temperature of the place must be made warmer, and the vat often stirred with the vat-staff.

The commencement of the vinous fermentation may be known by plunging the thermometer into the middle of the vat, for a minute, and when taken out, if a fermentation has commenced, the temperature of the contents will be higher than at the place where the vats are situated. When the vinous fermentation begins, it is very conspicuous, and may be known by its taste, swell, appearance, and effects. The contents will first gently rise, and swell with a slight movement and a little hissing. A considerable motion will take place, and the contents will increase in heat and bulk, while a quantity of air escapes.

It is impossible to lay down an exact time for a vinous fermentation; but for eighteen gallons, two or three days are generally sufficient for white wines; and red wines require a day or two more.

Flavouring the wine.

When the vinous fermentation is about half over, the flavouring ingredients are to be put into the vat and well stirred into the contents. If almonds form a component part, they are first to be beaten to a paste and mixed with a pint or two of the must. Nutmegs, cinnamon, ginger, seeds, &c. should before they are put into the vat, be reduced to powder, and mixed with some of the *must*.

Drawing the must.

When the must in the vat gives, by tasting, a strong vinous pungency, that is the period to stop the remaining slight fermentation, by drawing off the must, in order to have strong and generous wine.

A cock, or spicket and faucet is to be put into the tap-hole of the vat, and the must drawn off and put into open vessels, there to remain till the pressing is finished.

Pressing the husk.

As soon as all the must is drawn off from the vat, the husks are to be put into hair-bags, and the mouth of the bag is to be well fastened, then put into the press, and the whole pressed without delay. The must that is pressed out is to be mixed with the must that was drawn off from the vat. Many ways may be contrived for pressing a small vintage, for those persons who cannot afford to purchase a proper wine-press; but several wines do not require pressing: and may be strained through a sweet, clean, canvas bag, made with a pointed end downwards.

Casking the must.

Each cask is to be filled, within about an inch of the bung-hole, which should be covered over lightly with a flat piece of wood. The must now is perfectly cool and calm, and will remain in this state until the spirituous fermentation commences.

Spirituous fermentation.

The spirituous fermentation is essentially necessary to the clarification, goodness, and perfection of the wine. If the vinous fermentation has been well conducted, and the wine cellar be not too cold, a spirituous fermentation will commence in a few days, and abate in six or twelve days, the time depending on circumstances, and on the quality and quantity of the wine. The brandy or spirit assigned should at this time be put to the wine by pouring it in gently without disturbing the wine. The cask now, if not full, must be filled up and bunged with a wooden bung covered with a piece of new canvas larger than the bung. In about a month after the spirit has been added, the cask will again want filling up, this should be done with the overplus of the vintage, if not with some other good wine, and the cask re-bunged very tight.

The cask should be pegged once a month or oftener to see if the wine be clear and not thick, and as soon as it is fine and bright, it must be racked off its lees.

Racking the wine.

This is an operation highly requisite to the keeping wine good; to its purification, strength, colour, brilliancy, richness, and flavour, and is performed by drawing off the *wine* and leaving the *lees* in the cask. A siphon should be used, but if not, the cask should be tapped two or three days previously. It may be racked off into another cask, or into a vat or tub, and returned into the same cask again, *after it has been well cleaned*: and, if requisite, the cask may be slightly fumigated, immediately before the wine is returned into it. If the wine, on being tasted, is found weak, a little spirit is to be given to it the cask filled up and bunged tight.

The racking off ought to be performed in temperate weather, and as soon as the wines appear clear, a *second racking* will make them *perfectly brilliant*, and if so, they will want no fining.

Fining.

Many wines require fining *before* they are racked, and the operation of fining is not always necessary. Most wines, well made, do not want fining; this may be ascertained, by drawing a little into a glass, from a peg-hole.

One of the best finings is as follows:—Take one pound of fresh marsh-mallow roots, washed clean, and cut into small pieces; macerate them in two quarts of soft water, for twenty-four hours, then gently boil the liquor down to three half pints, strain it, and when cold mix with it half an ounce of pipe-clay or chalk, in powder, then pour the mucilage into the cask, and stir up the wine so as not to disturb the lees, and leave the vent-peg out for some days after.

Or, take boiled rice, two table-spoonsful, the white of one new egg, and half an ounce of burnt alum, in powder. Mix with a pint or more of the wine, then pour the mucilage into the cask, and stir the wine with a stout stick, but not to agitate the lees.

Or, dissolve, in a gentle heat, half an ounce of isinglass in a pint or more of the wine, then mix with it half an ounce of chalk, in powder: when the two are well incorporated, pour it into the cask, and stir the wine, so as not to disturb the lees.

As soon as wines are clear and bright, after being fined down, they ought to be racked into a sweet and clean cask, the cask filled up and bunged tight.

Bottling and corking.

Fine clear weather is best for bottling all sorts of wines, and much cleanliness is required. The first consideration, in bottling wines, is to examine and see if the wines are in a proper state. *The wines should be fine and brilliant*, or they will never brighten after.

The bottles must be all sound, clean, and dry, with plenty of good sound corks.

The cork is to be put in with the hand, and then driven well in with a flat wooden mallet, the weight of which ought to be a *pound and a quarter*, but however not to exceed a pound and a half, for if the mallet be too light or too heavy it will not drive the cork in *properly*, and may *break the bottle*. The corks must so completely fill up the neck of each bottle as to render them *air tight*, but leave a space of an inch between the wine and the cork.

When all the wine is bottled, it is to be stored in a cool cellar, and *on no account on the bottles' bottoms*, but on their sides and in saw-dust.

Apparatus for wine making.

To make wine well, and with facility, persons should have all the requisite apparatus, namely, the vats, vat-stuff, fruit-bruiser, strainer, hair-bags, wine-press, thermometer, and bottling machine.

Mr. Carnell's receipt for red gooseberry wine.

Take cold soft water, 10 gallons,—red gooseberries, 11 gallons, and ferment. Now mix raw sugar, 16 lbs.—beet-root, sliced, 2 lbs. and red tartar, in fine powder, 3 ounces. Afterwards put in sassafras chips, 1 lb. and brandy, one gallon, or less. This will make 18 gallons.

Another.

When the weather is dry, gather gooseberries about the time they are half ripe; pick them clean, put the quantity of a peck into a convenient vessel, and bruise them with a piece of wood, taking as much care as possible to keep the seeds whole. Now having put the pulp into a canvas bag, press out all the juice; and to every gallon of the gooseberries add about three pounds of fine loaf sugar: mix the whole together by stirring it with a stick, and as soon as the sugar is quite dissolved, pour it into a convenient cask, which will hold it exactly. If the quantity be about eight or nine gallons, let it stand a fortnight; if twenty gallons, forty days, and so on in proportion; taking care the place you set it in be cool. After standing the proper time, draw it off from the lees, and put it into another clean vessel of equal size, or into the same, after pouring the lees out, and making it clean; let a cask of ten or twelve gallons stand for about three months, and twenty gallons for five months, after which it will be fit for bottling off.

Red and white gooseberry wine.

Take cold soft water, 3 gallons,—red gooseberries, 1 1-2 gallons,—white gooseberries, 2 gallons. Ferment.

Now mix raw sugar, 5 lbs.—honey, 1 1-2 lbs.—tartar, in fine powder, 1 oz. Afterwards put in bitter almonds, two ounces, sweet-briar, one small handful, and brandy one gallon, or less. This will make six gallons.

White gooseberry or Champaigne wine.

Take cold soft water, 4 1-2 gallons, white gooseberries, 5 gallons. Ferment.

Now mix refined sugar, 6 pounds,—honey, 4 pounds,—white tartar, in fine powder, 1 oz. Put in orange and lemon peel, 1 oz. dry, or two ounces fresh; and add—white brandy half a gallon. This will make nine gallons.

Gooseberry wine of the best quality, resembling Champaigne.

To each Scotch pint of full ripe gooseberries, mashed, add 1 Scotch pint of water, milk warm, in which has been dissolved 1 lb. of single refined sugar: stir the whole well, and cover up the tub with a blanket, to preserve the heat generated by the fermentation of the ingredients: let them remain in this vessel three days, stirring them twice or thrice a day: strain off the liquor through a sieve, afterwards through a coarse linen cloth; put it into the cask: it will ferment without yeast. Let the cask be kept full with some of the liquor reserved for the purpose. It will ferment for ten days, sometimes for three weeks: when ceased, and only a hissing noise remains, draw off two or three bottles, according to the strength you wish it to have, from every 20 pint cask, and fill up the cask with brandy or whiskey; but brandy is preferable. To make it very good, and that it may keep well, add as much sherry, together with a 1-4 oz. of isinglass dissolved in water to make it quite liquid; stir the whole well. Bung the cask up, and surround the bung with clay; the closer it is bunged, the better; a fortnight after, if it be clear at top, taste it; if not sweet enough, add more sugar; 22 lbs. is the just quantity in all for 20 pints of wine; leave the wine six months in the cask; but after being quite fine, the sooner it is bottled, the more it will sparkle and resemble Champaigne. The process should be carried on in a place where the heat is between 48 deg. and 56 deg. Fahrenheit.—N. B. Currant wine may be made in the same manner.

To make British Champaigne.

Take gooseberries before they are ripe, crush them with a mallet in a wooden bowl, and to every gallon of fruit put a gallon of water; let it stand two days, stirring it well; squeeze the mixture well with the hands through a hop-sieve; then measure the liquor, and to every gallon put 3 1-2 lbs. of loaf-sugar; mix it well in the tub, and let it stand one day: put a bottle of the best brandy into the cask; which leave open five or six weeks, taking off the scum as it rises; then make it up, and let it stand one year in the barrel before it is bottled.

The proportion of brandy to be used for this liquor, is one pint to 7 gallons.

Gooseberry and currant wine mixed.

Take cold soft water, 6 gallons,—gooseberries, 4 do.—currants, 4 do. Ferment.

Mix, raw sugar, 12 lbs.—honey, 3 lbs. and tartar, in fine powder, 1 1-2 oz.—bitter almonds, 1 1-4 oz. Put in brandy 6 pints, or more. This will make 12 gallons.

Another.

Take cold soft water, 5 1-2 gallons,—gooseberries and currants, 4 gallons. Ferment. Then add—raw sugar, 12 1-2 lbs.—tartar, in fine powder, 1 oz.—ginger, in powder, 3 ounces—sweet marjoram, half a handful,—British spirits, 1 quart. This will make 9 gallons.

Red currant wine.

Take cold soft water, 11 gallons—red currants, 8 gallons,—raspberries, 1 quart. Ferment. Mix, raw sugar, 20 lbs.—beet-root, sliced, 2 lbs. and red tartar, in fine powder, 3 ounces. Put in 1 nutmeg, in fine powder; add brandy, 1 gallon. This will make 18 gallons.

Another.

Boil four gallons of spring water, and stir into it 8 lbs. of honey; when thoroughly dissolved, take it off the fire; then stir it well in order to raise the scum, which take clean off, and cool the liquor.

When thus prepared, press out the same quantity of the juice of red currants moderately ripe, which being well strained, mix well with the water and honey, then put them into a cask, or a large earthen vessel, and let them stand to ferment for 24 hours; then to every gallon add 2 lbs. of fine sugar, stir them well to raise the scum, and when well settled, take it off, and add half an ounce of cream of tartar, with the whites of two or three eggs, to refine it. When the wine is well settled and clear, draw it off into a small vessel, or bottle it up, keeping it in a cool place.

Of white currants, a wine after the same manner may be made, that will equal in strength and pleasantness many sorts of white wine; but as for the black or Dutch currants, they are seldom used, except for the preparation of medicinal wines.

Another.

Gather the currants in dry weather, put them into a pan and bruise them with a wooden pestle; let them stand about 20 hours, after which strain through a sieve; add 3 lbs. of fine powdered sugar to each 4 quarts of the liquor, and after shaking it well, fill the vessel and put a quart of good brandy to every seven gallons. In 4 weeks, if it does not prove quite clear, draw it off into another vessel, and let it stand previous to bottling it off about 10 days.

Red and white currant wine.

Take of cold soft water, 12 gallons,—white currants, 4 do.—red currants, 3 do. Ferment. Mix, raw sugar, 25 lbs.—white tartar, in fine powder, 3 oz. Put in sweet-briar leaves, 1 handful,—lavender leaves, 1 do.—then add spirits, 2 quarts or more. This will make 18 gallons.

Dutch currant wine.

Take of cold soft water, 9 gallons,—red currants, 10 do. Ferment. Mix, raw sugar, 10 lbs.—beet-root, sliced, 2 lbs. red tartar, in fine powder, 2 oz. Put in bitter almonds, 1 oz.—ginger, in powder, 2 oz.—then add brandy, 1 quart. This will make 18 gallons.

Dutch red currant wine.

Take of cold soft water, 11 gallons,—red currants, 8 do. Ferment. Mix, raw sugar, 12 lbs.—red tartar, in fine powder, 2 oz. Put in coriander seed, bruised, 2 oz.—then add British spirit, 2 quarts. This will make 18 gallons.

Mixed berries from a small garden.

Take of cold soft water, 11 gallons,—fruit, 8 do. Ferment. Mix, treacle, 14 or 16 lbs. —tartar, in powder, 1 oz. Put in ginger, in powder, 4 oz.—sweet herbs, 2 handsful:—then add spirits, 1 or 2 quarts. This will make 18 gallons.

To make compound wine.

An excellent family wine may be made of equal parts of red, white, and black currants, ripe cherries, and raspberries, well bruised, and mixed with soft water, in the proportion of 4 lbs. of fruit to 1 gallon of water. When strained and pressed, 3 lbs. of moist sugar are to be added to each gallon of liquid. After standing open for three days, during which it is to be stirred frequently, it is to be put into a barrel, and left for a fortnight to work, when a ninth part of brandy is to be added, and the whole bunged down. In a few months, it will be a most excellent wine.

Other mixed fruits of the berry kind.

Take of cold soft water, 2 gallons,—fruit, 18 do.—Ferment.—honey, 6 lbs.—tartar, in fine powder, 2 oz. Put in peach leaves, 6 handsful:—then add brandy, 1 gallon. This will make 18 gallons.

White currant wine.

Take of cold soft water, 9 gallons,—white currants, 9 do.—white gooseberries, 1 do. Ferment. Mix, refined sugar, 25 lbs.—white tartar, in powder, 1 oz.—clary seed, bruised, 2 oz. or clary flowers, or sorrel flowers, 4 handsful:—then add, white brandy, 1 gallon. This will make 18 gallons.

Another.

Take of cold soft water, 10 gallons,—white currants, 10 do. Ferment. Mix, refined sugar, 25 lbs.—white tartar, in fine powder, 1 oz.—then add, bitter almonds, 2 oz. and white brandy, one gallon. This will make eighteen gallons.

Black currant wine.

Take of cold soft water, 10 gallons,—black currants, 6 do.—strawberries, 3 do. Ferment. Mix, raw sugar, 25 lbs.—red tartar, in fine powder, 6 oz. orange-thyme, 2 handsful: then add brandy, 2 or 3 quarts. This will make 18 gallons.

Another.

Take of cold soft water, 12 gallons,—black currants, 5 do.—white or red currants, or both, 3 do. Ferment. Mix, raw sugar, 30 lbs. or less,—red tartar, in fine powder, 5 oz.—ginger, in powder, 5 oz.—then add brandy, 1 gallon, or less. This will make 18 gallons.

Strawberry wine.

Take of cold soft water, 7 gallons,—cider, 6 do.—strawberries, 6 do. Ferment. Mix, raw sugar, 16 lbs.—red tartar, in fine powder, 3 oz. —the peel and juice of 2 lemons: then add brandy, 2 or 3 quarts. This will make 18 gallons.

Another.

Take of cold soft water, 10 gallons,—strawberries, 9 do. Ferment. Mix, raw sugar, 25 lbs.—red tartar, in fine powder, 3 oz.—2 lemons and 2 oranges, peel and juice: then add brandy, 1 gallon. This will make 18 gallons.

Raspberry wine.

Take of cold soft water, 6 gallons,—cider, 4 do.—raspberries, 6 do.—any other fruit, 3 do. Ferment. Mix, raw sugar, 18 or 20 lbs.—red tartar, in fine powder, 3 oz.—orange and lemon peel, 2 oz. dry, or 4 oz. fresh: then add brandy, 3 quarts. This will make 18 gallons.

Another.

Gather the raspberries when ripe, husk them and bruise them; then strain them through a bag into jars or other vessels. Boil the juice, and to every gallon put a pound and a half of lump sugar. Now add whites of eggs, and let the whole boil for fifteen minutes; skimming it as the froth rises. When cool and settled, decant the liquor into a cask, adding yeast to make it ferment. When this has taken place, add a pint of white wine, or half a pint of proof spirit to each gallon contained in the cask, and hang a bag in it containing an ounce of bruised mace. In three months, if kept in a cool place, it will be very excellent and delicious wine.

Mulberry wine.

On a dry day, gather mulberries, when they are just changed from redness to a shining black; spread them thinly on a fine cloth, or on a floor or table, for twenty-four hours; and then press them. Boil a gallon of water with each gallon of juice; putting to every gallon of water an ounce of cinnamon bark, and six ounces of sugar candy finely powdered. Skim and strain the water, when it is taken off and settled, and put to it the mulberry juice. Now add to every gallon of the mixture a pint of white or Rhenish wine. Let the whole stand in a cask to ferment, for five or six days. When settled, draw it off into bottles, and keep it cool.

Elder-berry wine.

Take of cold soft water, 16 gallons,—Malaga raisins, 50 lbs.—elder-berries, 4 gallons,—red tartar, in fine powder, 4 ounces. Mix, ginger, in powder, 5 ounces,—cinnamon, cloves, and mace, of each 2 ounces,—3 oranges or lemons, peel and juice. Then add 1 gallon of brandy. This will make eighteen gallons.

Another.

In making elder juice, let the berries be fully ripe, and all the stalks be clean picked from them; then, have a press ready for drawing off all the juice, and four hair cloths, somewhat broader than the press: lay one layer above another, having a hair cloth betwixt every layer, which must be laid very thin, and pressed a little at first, and then more till the press be drawn as close as possible. Now take out the berries, and press all the rest in the like manner: then take the pressed berries, break out all the lumps, put them into an open headed vessel, and add as much liquor as will just cover them. Let them infuse so for seven or eight days; then put the best juice into a cask proper for it to be kept in, and add one gallon of malt spirits, not rectified, to every twenty gallons of elder juice, which will effectually preserve it from becoming sour for two years at least.

Another.

Pick the berries when quite ripe, put them into a stone jar, and set them in an oven, or in a kettle of boiling water, till the jar is hot through, then take them out, and strain them through a coarse sieve: squeeze the berries, and put the juice into a clean kettle. To every quart of juice put a pound of fine Lisbon sugar: let it boil, and skim it well. When clear and fine, pour it into a cask. To every ten gallons of wine add an ounce of isinglass dissolved in cider, and six whole eggs. Close it up, let it stand six months, and then bottle it.

To make an imitation of Cyprus wine.

To ten gallons of water put ten quarts of the juice of white elder berries, pressed gently from the berries by the hand, and passed through a sieve, without bruising the seeds: add to every gallon of liquor three pounds of Lisbon sugar, and to the whole quantity two ounces of ginger sliced, and one ounce of cloves. Boil this nearly an hour, taking off the scum as it rises, and pour the whole, to cool, in an open tub, and work it with ale yeast, spread upon a toast of bread, for three days. Then turn it into a vessel that will just hold it, adding about a pound and a half of bruised raisins, to lie in the liquor till drawn off, which should not be done till the wine is fine.

This wine is so much like the fine rich wine brought from the island of Cyprus, in colour, taste, and flavour, that it has deceived the best judges.

To make elder-flower wine; or English Frontiniac.

Boil eighteen pounds of white powdered sugar in six gallons of water, and two whites of eggs well beaten; skim it, and put in a quarter of a peck of elder-flowers; do not keep them on the fire. When cool, stir it, and put in six spoonsful of lemon juice, four or five of yeast, and beat well into the liquor; stir it well every day; put six pounds of the best raisins, stoned, into the cask, and tun the wine. Stop it close, and bottle in six months. When well kept, this wine will pass very well for Frontiniac.

Another.

To six gallons of spring water put six pounds of sun raisins cut small, and a dozen pounds of fine sugar; boil the whole together for about an hour and a half. When the liquor is cold, put half a peck of ripe elder-flowers in, with about a gill of lemon juice, and half the quantity of ale yeast. Cover it up, and after standing three days, strain it off. Now pour it into a cask that is quite clean, and that will hold it with ease. When this is done, put a quart of Rhenish wine to every gallon; let the bung be slightly put in for twelve or fourteen days; then stop it down fast, and put it in a cool dry place for four or five months, till it be quite settled and fine; then bottle it off.

Imitation of port wine.

Take 6 gallons of good cider,—1 1-2 gallons of port wine,—1 1-2 gallons of the juice of elder-berries,—3 quarts of brandy,—1 1-2 ounces of cochineal. This will produce 9 1-2 gallons.

Bruise the cochineal very fine, and put it with the brandy into a stone bottle; let it remain at least a fortnight, shaking it well once or twice every day; at the end of that time procure the cider, and put five gallons into a nine gallon cask, add to it the elder juice and port wine, then the brandy and cochineal. Take the remaining gallon of cider to rinse out the bottle that contained the brandy; and lastly, pour it into the cask, and bung it down very close, and in six weeks it will be ready for bottling.

It is, however, sometimes not quite so fine as could be wished: in that case add two ounces of isinglass, and let it remain a fortnight or three weeks longer, when it will be perfectly bright: it would not be amiss, perhaps, if the quantity of isinglass mentioned was added to the wine before it was bunged down, it will tend, very considerably to improve the body of the wine. If it should not appear sufficiently rough flavoured, add an ounce, or an ounce and a half of roche-alum, which will, in most cases, impart a sufficient astringency.

After it is bottled, it must be packed in as cool a place as possible. It will be fit for using in a few months; but if kept longer it will be greatly improved.

Wortleberry or bilberry wine.

Take of cold soft water, 6 gallons,—cider, 6 gallons,—berries, 8 gallons:—Ferment. Mix raw sugar, 20 pounds,—tartar, in fine powder, 4 ounces. Add ginger, in powder, 4 ounces,—lavender and rosemary leaves, 2 handsful,—rum or British spirits, 1 gallon. This will make 18 gallons.

Birch wine.

The season for obtaining the liquor from birch-trees, is in the latter end of February, or the beginning of March, before the leaves shoot out, and as the sap begins to rise. If the time is delayed, the juice will grow too thick to be drawn out. It should be as thin and clear as possible. The method of procuring the juice is by boring holes in the trunk of the tree, and fixing faucets of elder; but care should be taken not to tap it in too many places at once, for fear of injuring the tree. If the tree is large, it may be bored in five or six places at once, and bottles are to be placed under the aperture for the sap to flow into. When four or five gallons have been extracted from different trees, cork the bottles very close, and wax them till the wine is to be made, which should be as soon as possible, after the sap has been obtained. Boil the sap, and put 4 pounds of loaf sugar to every gallon, also the peel of a lemon cut thin; then boil it again for nearly an hour, skimming it all the time. Now pour it into a tub, and as soon as it is almost cold, work it with a toast spread with yeast, and let it stand five or six days, stirring it twice or three times each day. Into a cask that will contain it, put a lighted brimstone match, stop it up till the match is burnt out, and then pour the wine into it, putting the bung lightly in, till it has done working. Bung it very close for about three months, and then bottle it. It will be good in a week after it is put into the bottles.

Another.

Birch wine may be made with raisins in the following manner: To a hogshead of birch-water, take four hundred of Malaga raisins: pick them clean from the stalks, and cut them small. Then boil the birch liquor for one hour at least, skim it well, and let it stand till it be no warmer than milk. Then put in the raisins, and let it stand close covered, stirring it well four or five times every day. Boil all the stalks in a gallon or two of birch liquor, which when added to the other, when almost cold, will give it an agreeable roughness. Let it stand ten days, then put it in a cool cellar, and when it has done hissing in the vessel, stop it up close. It must stand at least nine months before it is bottled.

Blackberry wine.

Having procured berries that are fully ripe, put them into a large vessel of wood or stone, with a cock in it, and pour upon them as much boiling water as will cover them. As soon as the heat will permit the hand to be put into the vessel, bruise them well till all the berries are broken. Then let them stand covered till the berries begin to rise towards the top, which they usually do in three or four days. Then draw off the clear into another vessel, and add to every ten quarts of this liquor, a pound of sugar. Stir it well and let it stand to work a week or ten days, in another vessel like the first. Then draw it off at the cock through a jelly-bag into a large vessel. Take four ounces of isinglass, and lay it to steep twelve hours in a pint of white wine. The next morning, boil it upon a slow fire till it is all dissolved. Then take a gallon of blackberry-juice, put in the dissolved isinglass, give them a boil together, and pour all into the vessel. Let it stand a few days to purge and settle, then draw it off, and keep it in a cool place.

Spruce wine.

For this, which is only a superior sort of white spruce beer, proceed as follows:—To every gallon of water take 1 1-2 lbs. of honey and 1-2 lb. of fine starch. The starch, however, previously to its being blended with the honey, liquor, or syrup, must be reduced to a transparent jelly, by boiling it with part of the water purposely preserved. A quarter of a pound of essence of spruce may be used to 6 gallons of water; and the same method may be pursued in working, fining, and bottling, as directed for white spruce beer.

Spruce is a wholesome and pleasant drink to those who are used to it, and persons soon become habituated. It contains a vast quantity of fixed air, which is extremely bracing; and the use of this liquor is particularly to be recommended to such as are troubled with scorbutic humours, or have the gravel. It is chiefly used in summer.

Juniper-berry wine.

Take of cold soft water, 18 gallons,—Malaga or Smyrna raisins, 35 lbs.—juniper berries, 9 quarts,—red tartar, 4 ounces,—wormwood and sweet majoram, each 2 handsful,—British spirit, two quarts, or more. Ferment for ten or twelve days.—This will make eighteen gallons.

To make damson wine.

Take of cold soft water, 11 gallons,—damsons, 8 gallons. Ferment. Mix raw sugar, 30 pounds,—red tartar, in fine powder, 6 oz. Add brandy, 1 gallon. This will make 18 gallons.

"When the *must*," says Mr. Carnell, "has fermented 2 days, (during which time it should be stirred up two or three times;) take out of the vat about 2 or 3 quarts of the stones, and break them and the kernels, and return them into the vat again.

Another method.

Take a considerable quantity of damsons and common plums inclining to ripeness: slit them in halves, so that the stones may be taken out, then mash them gently and add a little water and honey. Add to every gallon of the pulp a gallon of spring water, with a few bay leaves and cloves; boil the mixture, and add as much sugar as will well sweeten it; skim off the froths, and let it cool. Now press the fruit, squeezing out the liquid part: strain all through a fine strainer, and put the water and juice together in a cask. Having allowed the whole to stand and ferment for three or four days, fine it with white sugar, flour, and white of eggs; draw it off into bottles, then cork it well. In twelve days it will be ripe, and will taste like weak Port, having the flavour of Canary.

Another.

Gather the damsons on a dry day, weigh them, and then bruise them. Put them into a stein that has a cock in it, and to every 8 pounds of fruit add a gallon of water. Boil the water, skim it, and put it scalding hot to the fruit. Let it stand two days, then draw it off and put it into a vessel, and to every gallon of liquor put 2 1-2 lbs. of fine sugar. Fill up the vessel, and stop it close, and the longer it stands the better. Keep it for twelve months in the vessel, and then bottle, putting a lump of sugar into every bottle. The small damson is the best for this purpose.

Cherry wine.

Take of cold soft water, 10 gallons—cherries, 10 gallons. Ferment. Mix raw sugar, 30 pounds—red tartar, in fine powder, 3 oz. Add brandy, 2 or 3 quarts. This will make 18 gallons.

Two days after the cherries have been in the vat, Mr. Carnell says, we should take out about 3 quarts of the cherry stones, break them and the kernels, and return them into the vat again.

Another.

Take cherries, nearly ripe, of any red sort, clear them of the stalks and stones, then put them into a glazed earthen vessel, and squeeze them to a pulp. Let them remain in this state for 12 hours to ferment; then put them into a linen cloth not too fine, and press out the juice with a pressing board, or any other convenient instrument. Now let the liquor stand till the scum rises, and with a ladle or skimmer take it clean off; then pour the clearer part, by inclination, into a cask, where, to each gallon, put a pound of the best loaf sugar, and let it ferment for seven or eight days. Draw it off, when clear, into lesser casks, or bottles; keep it cool, as other wines, and in ten or twelve days it will be ripe.

To make Morella wine.

Cleanse from the stalks, sixty pounds of Morella cherries, and bruise them so that the stones shall be broken. Now press out the juice and mix it with 6 gallons of sherry wine, and 4 gallons of warm water. Having grossly powdered separate ounces of nutmeg, cinnamon, and mace, hang them separately, in small bags, in the cask containing the mixture. Bung it down, and in a few weeks it will become a deliciously flavoured wine.

To make peach wine.

Take of cold soft water, 18 gallons,—refined sugar, 25 pounds—honey, 6 pounds,—white tartar, in fine powder, 2 ounces. Peaches, sixty or eighty in number. Ferment. Then add 2 gallons of brandy. This will make 18 gallons.

The *first division* is to be put into the vat, and the day after, *before* the peaches are put in, take the stones from them, break them and the kernels, then put them and the pulp into the vat, and proceed with the general process.

Peach and apricot wine.

Take peaches, nectarines, &c. pare them and take the stones out; then slice them thin, and pour over them from a gallon to two gallons of water, and a quart of white wine. Place the whole on a fire to simmer gently for a considerrble time, till the sliced fruit becomes soft; pour off the liquid part into another vessel containing more peaches that have been sliced but not heated; let them stand for twelve hours, then pour out the liquid part, and press what remains through a fine hair bag. Let the whole be now put into a cask to ferment; add of loaf-sugar, a pound and a half to each gallon. Boil well, an ounce of beaten cloves in a quart of white wine, and add it to the above.

Apricot wine may be made by only bruising the fruit and pouring the hot liquor over it. This wine does not require so much sweetening. To give it a curious flavour, boil an ounce of mace, and half an ounce of nutmegs, in a quart of white wine; and when the wine is fermenting pour the liquid in hot. In about twenty days, or a month, these wines will be fit for bottling.

Apricot wine.

Boil together three pounds of sugar, and three quarts of water; and skim it well. Put in six pounds of apricots pared and stoned, and let them boil till they become tender. Then take them up, and when the liquor is cold, bottle it. After taking out the apricots, let the liquor be boiled with a sprig of flowered clary. The apricots will make marmalade, and be very good for present use.

Lemon wine.

Pare off the rinds of 6 large lemons, cut them, and squeeze out the juice. Steep the rinds in the juice, and put to it a quart of brandy. Let it stand three days in an earthen pot close stopped; then squeeze 6 more, and mix with it 2 quarts of spring water, and as much sugar as will sweeten the whole. Boil the water, lemons, and sugar together, and let it stand till it be cool. Then add a quart of white wine, and the other lemons and brandy; mix them together, and run it through a flannel bag into some vessel, Let it stand three months and then bottle it off. Cork the bottles well; keep it cool, and it will be fit to drink in a month or six weeks.

Another.

Pare 5 dozen of lemons very thin, put the peels into 5 quarts of French brandy, and let them stand 14 days. Then make the juice into a syrup with 3 lbs. of single refined sugar, and when the peels are ready, boil 15 gallons of water with 40 lbs. of single refined sugar for half an hour. Then put it into a tub, and when cool add to it 1 spoonful of yeast, and let it work two days. Then tun it, and put in the brandy, peels, and syrup. Stir them all together, and close up the cask. Let it stand three months, then bottle it, and it will be as pale and as fine as any citron water.

Apple white wine.

Take of cold soft water, 2 gallons,—apples, well bruised, 3 bushels,—honey, 10 lbs.—white tartar, 2 ounces,—1 nutmeg, in powder,—rum, 2 quarts.—This will make 18 gallons.

To make apple wine.

To every gallon of apple juice, immediately as it comes from the press, add 2 lbs of common loaf sugar; boil it as long as any scum rises, then strain it through a sieve, and let it cool; add some good yeast, and stir it well; let it work in the tub for two or three weeks, or till the head begins to flatten, then skim off the head, draw it clear off, and tun it. When made a year, rack it off, and fine it with isinglass; then add 1-2 a pint of the best rectified spirit of wine; or a pint of French brandy, to every 8 gallons.

Apple red wine.

Take of cold soft water, 2 gallons—of apples, well bruised, 3 bushels. Ferment. Mix, raw sugar, 15 lbs.—beet root sliced, 4 lbs.—red tarter, in fine powder, 3 oz. then add ginger, in powder, 3 oz. rosemary and lavender leaves, of each 2 handsful,—British spirits, 2 quarts. This will make 18 gallons.

To make quince wine.

Gather the quinces when pretty ripe, in a dry day, rub off the down with a linen cloth, then lay them in hay or straw for ten days, to *perspire*. Now cut them in quarters, take out the cores, and bruise them well in a mashing tub with a wooden pestle. Squeeze out the liquid part, by pressing them in a hair bag, by degrees, in a cider press; strain this liquor through a fine sieve, then warm it gently over a fire, and skim it, but do not suffer it to boil. Now sprinkle into it some loaf-sugar reduced to powder: then, in a gallon of water and a quart of white wine, boil 12 or 14 large quinces thinly sliced; add 2 lbs. of fine sugar and then strain off the liquid part, and mingle it with the natural juice of the quinces; put this into a cask (not to fill it) and mix them well together; then let it stand to settle; put in 2 or 3 whites of eggs, then draw it off. If it be not sweet enough, add more sugar, and a quart of the best Malmsey. To make it still better boil a 1-4 lb. of stoned raisins, and 1-2 an oz. of cinnamon bark in a quart of the liquor, to the consumption of a third part, and straining it, put it into the cask when the wine is fermenting.

Another method.

Take 20 large quinces, gathered when they are dry and full ripe. Wipe them clean with a coarse cloth, and grate them with a large grater or rasp as near the cores as possible; but do not touch the cores. Boil a gallon of spring-water, throw in the quinces, and let them boil softly about a quarter of an hour. Then strain them well into an earthen pan, on 2 lbs. of double refined sugar. Pare the peel of 2 large lemons, throw them in, and squeeze the juice through a sieve. Stir it about till it be very cool, and then toast a thin bit of bread very brown, rub a little yeast on it, and let the whole stand close covered 24 hours. Then take out the toast and lemon, put the wine in a cask, keep it three months, and then bottle it. If a 20 gallon cask is wanted, let it stand six months before bottling it; and remember, when straining the quinces, to wring them hard in a coarse cloth.

Orange wine.

Put 12 lbs. of powdered sugar, with the whites of 8 or 10 eggs well beaten, into 6 gallons of spring water; boil them 3-4 of an hour; when cold, put into it 6 spoonsful of yeast and the juice of 12 lemons, which being pared, must stand with 2 lbs. of white sugar in a tankard, and in the morning skim off the top, and then put it into the water; add the juice and rinds of 50 oranges, but not the white or pithy parts of the rinds; let it work all together 2 days and 2 nights; then add two quarts of Rhenish or white wine, and put it into the vessel.

Another.

To 6 gallons of water put 15 lbs. of soft sugar; before it boils, add the whites of six eggs well beaten, and take off the scum as it rises; boil it 1-2 an hour: when cool, add the juice of 50 oranges, and two-thirds of the peels cut very thin; and immerse a toast covered with yeast. In a month after it has been in the cask, add a pint of brandy and 2 quarts of Rhenish wine: it will be fit to bottle in 3 or 4 months, but it should remain in bottle for 12 months before it is drank.

To make orange and lemon wine.

Orange wine of a superior quality may be made with 2 lbs. of clayed sugar, and 1 lb. of Malaga raisins to each gallon of water, to which add the juice and peel of an orange, and to every 100 gallons of fluid 4 lbs. of Rhenish tartar.

Two lbs. of honey, 1 lb. of Malaga raisins, with the juice and peel of a large orange, to every gallon of water, and 4 lbs. of Rhenish tartar to every 100 gallons fluid, will make an orange wine still superior to the former. Steep and press the fruit, and expend the tartar in setting, raising, and cutting the backs; the orange peel and juice are not to be added until the last stage of fermentation, that is on cutting: they will possess infinitely more vinosity than the ordinary orange wines, indeed, nearly as much as the juice of the wine.

Lemon wine, equally delicious, may be made in a similar manner: both these wines, as they advance in age, lose much of the grosser part of the orange and lemon flavour; one approaches the bergamot and the other a fine citron, and become fragrant as they advance in years: they will be more improved if treacle be used, divested of its colour and burnt flavour.

To make parsnip wine.

To 12 pounds of parsnips, cut in slices, add 4 gallons of water; boil them till they become quite soft. Squeeze the liquor well out of them, run it through a sieve, and add to every gallon 3 pounds of loaf sugar. Boil the whole three quarters of an hour, and when it is nearly cold, add a little yeast. Let it stand for ten days in a tub, stirring it every day from the bottom, then put it into a cask for twelve months: as it works over, fill it up every day.

White mead wine.

Take of cold soft water, seventeen gallons,—white currants, six quarts. Ferment. Mix honey, 30 pounds,—white tartar, in fine powder, 3 oz. Add balm and sweetbriar, each 2 handsful,—white brandy, 1 gallon. This will make 18 gallons.

Red mead, or metheglin wine.

Take of cold soft water, 17 gallons,—red currants, 6 quarts.—black currants 2 quarts. Ferment. Mix, honey, 25 pounds,—beet root, sliced, 1 pound,—red tartar, in fine powder, 4 oz. Add cinnamon, in powder, 2 oz.—brandy, 1 gallon. This will make 18 gallons.

Another.

Fermented mead is made in the proportion of 1 pound of honey to 3 pints of water; or by boiling over a moderate fire, to two-thirds of the quantity, three parts water and one part honey. The liquor is then skimmed and casked, care being taken to keep the cask full while fermenting. During the fermenting process, the cask is left unstopped and exposed the sun, or in a warm room, until the working cease. The cask is then bunged, and a few months in the cellar, renders it fit for use. Mead is rendered more vinous and pleasant, by the addition of cut raisins, or other fruits, boiled after the rate of half a pound of raisins to six pounds of honey, with a toasted crust of bread, an ounce of salt of tartar in a glass of brandy, being added to the liquor when casked; to which some add five or six drops of the essence of cinnamon; others, pieces of lemon peel with various syrups.

Walnut mead wine.

To every gallon of water put three pounds and a half of honey, and boil them together three quarters of an hour. Then to every gallon of liquor put about two dozen of walnut leaves, pour the boiling liquor upon them, and let them stand all night. Then take out the leaves, put in a spoonful of yeast, and let it work for two or three days. Then make it up, and after it has stood for three months, bottle it.

To make American honey wine.

Put a quantity of the comb, from which honey has been drained, in a tub, and add a barrel of cider, immediately from the press; this mixture stir, and leave for one night. It is then strained before fermentation; and honey added, until the specific gravity of the liquor is sufficient to bear an egg. It is then put into a barrel; and after the fermentation is commenced, the cask is filled every day, for three or four days, that the froth may work out of the bung-hole. When the fermentation moderates, put the bung in loosely, lest stopping it tight might cause the cask to burst. At the end of five or six weeks, the liquor is to be drawn off into a tub, and the whites of eight eggs, well beaten up, with a pint of clean sand, are to be put into it: then add a gallon of cider spirit; and after mixing the whole together, return it into the cask, which is to be well cleaned, bunged tight, and placed in a proper situation for racking off, when fine. In the month of April following, draw it off into kegs, for use; and it will be equal to almost any foreign wine.

Cowslip red wine.

Take of cold soft water, 18 gallons,—Smyrna raisins, 40 lbs. Ferment. Mix beetroot, sliced, 3 pounds,—red tartar, in fine powder, 2 oz. Add cowslip-flowers, 14 lbs.—cloves and mace, in powder, 1 oz.—Brandy, 1 gallon. This will make 18 gallons.

Cowslip white wine.

Take of cold soft water, 18 gallons,—Malaga raisins, 35 lbs.—white tartar, in fine powder, 2 oz. Ferment. Mix cowslip-flowers, 16 lbs. Add white brandy, 1 gallon. This will make 18 gallons.

Cowslip mead

Is made in this manner: to 15 gallons of water put 30 pounds of honey, and boil it till 1 gallon be wasted. Skim it, take it off the fire, and have ready 16 lemons cut in halves. Take a gallon of the liquor, and put it to the lemons. Put the rest of the liquor into a tub, with 7 pecks of cowslips, and let them stand all night. Then put in the liquor with the lemons, 8 spoonsful of new yeast, and a handful of sweet briar. Stir them all well together, and let it work three or four days. Then strain it, put it into the cask, and after it has stood six months, bottle it off.

Cider white wine.

Take of cold soft water, 2 quarts,—cider, 9 gallons,—honey, 8 pounds,—white tartar, in fine powder, 2 oz. Ferment. Mix cinnamon, cloves and mace, 2 oz. Add rum, 1-2 gallon. This will make 9 gallons.

Cider red wine.

Take of cold soft water, 3 gallons,—cider, 16 gallons,—honey 10 pounds. Ferment. Add raw sugar, 4 pounds,—beet-root, sliced, 4 pounds,—red tartar, in fine powder, 6 oz. Mix sweet marjoram and sweet briar, 3 handsful, rum, 1 gallon. This will make 18 gallons.

Cider wine.

Take of cold soft water, 4 gallons,—cider, 15 gallons,—honey, 12 pounds,—tartar, in fine powder, 2 ounces. Ferment. Mix ginger, in powder, 6 ounces,—sage and mint, 2 handsful. Add British spirits, 1 gallon. This will make 18 gallons.

Grape red wine.

Take of cold soft water, 5 gallons,—black, or red grapes, 40 pounds. Ferment. Mix cider, 9 gallons,—raw sugar, 20 pounds, barberry leaves, 3 handsful,—beet-root, sliced, 2 pounds,—red tartar, in powder, 4 ounces. Add white elder flowers, 6 handsful, or sassafras chips, 4 pounds. Brandy, 1 gallon. This will make 18 gallons.

Another.

Take of cold soft water, 6 gallons, grapes of any colour, 30 pounds. Ferment. Mix treacle, 10 pounds,—beet-root, sliced, 1 1-2 pounds,—red tartar, in powder, 2 ounces. Add rosemary leaves, 2 handsful. Brandy, half a gallon. This will make 9 gallons.

Another.

Take of cold soft water, 8 gallons,—grapes, of any sort, 100 pounds. Ferment. Mix raw sugar, 20 pounds,—beet-root, sliced, 4 pounds,—barberry leaves, 4 handsful,—red tartar, in powder, 6 ounces. Add coriander seed, bruised, 2 ounces. Brandy, 6 quarts. This will make 18 gallons.

Grape white wine.

Take of cold soft water, 13 gallons,—white grapes, 50 pounds. Ferment. Mix refined sugar, 25 pounds,—white tartar, in powder, 3 ounces. Add clary seed, bruised, 3 ounces, or clary flowers, 6 handsful. Rum, 1 gallon. This will make 18 gallons.

To make raisin wine equal to sherry.

Let the raisins be well washed and picked from the stalks; to every pound thus prepared and chopped, add 1 quart of water which has been boiled and has stood till it is cold. Let the whole stand in the vessel for a month, being frequently stirred. Now let the raisins be taken from the cask, and let the liquor be closely stopped in the vessel. In the course of a month, let it be racked into another vessel, leaving all the sediment behind, which must be repeated till it becomes fine, when add to every ten gallons six pounds of fine sugar, and one dozen of Seville oranges, the rinds being pared very thin, and infused in two quarts of brandy, which should be added to the liquor at its last racking. Let the whole stand three months in the cask, when it will be fit for bottling; it should remain in the bottle for a twelve-month.

To give it the flavour of Madeira, when it is in the cask, put in a couple of green citrons, and let them remain till the wine is bottled.

Another raisin wine.

Put two hundred weight of raisins, with the stalks, into a hogshead, and fill it almost with spring water; let them steep for about twelve days, frequently stirring, and after pouring off the juice, dress the raisins and mash them. The whole should then be put together into a very clean vessel that will exactly contain it. It will hiss for some time, during which it should not be stirred; but when the noise ceases, it must be stopped close, and stand for about six or seven months: and then, if it proves fine and clear, rack it off into another vessel of the same size. Stop it up, and let it remain for twelve or fourteen weeks longer, then bottle it off. If it should not prove clear, fine it down with three ounces of isinglasss, and a quarter of a pound of sugar-candy, dissolved in some of the wine.

Another grape wine.

To every gallon of ripe grapes but a gallon of soft water, bruise the grapes, let them stand a week without stirring, and draw the liquor off fine; to every gallon of wine put three pounds of lump sugar; put the whole into a vessel, but do not stop it till it has done hissing, then stop it close, and in six months it will be fit for bottling.

A better wine, though smaller in quantity, will be made by leaving out the water; and diminishing the quantity of sugar. Water is necessary, only where the juice is so scanty, or so thick, as in cowslip, balm, or black currant wine, that it could not be used without it.

Claret vine-leaf wine.

Take of cold soft water, 18 gallons,—claret vine-leaves, 3 pecks. Ferment. Mix raw sugar, 50 pounds,—barberries, 6 quarts,—red tartar, in fine powder, 8 ounces. Add roses, 6 or 8 handsful,—sassafras chips, 3 pounds. Brandy, 1 gallon or more.

Mr. Carnell directs to macerate the vine-leaves in the water 3 days, and then proceed with the general process. This will make 18 gallons.

Another.

Take of cold soft water, 11 gallons,—claret vine-leaves, 2 pecks. Ferment. Add cider, 9 gallons,—raw sugar, 30 pounds,—red tartar, in powder, 6 ounces. Mix cinnamon, in powder, 2 ounces,—2 nutmegs in powder.—Brandy, 1 gallon. This will make 18 gallons.

To make wine from frosted potatoes.

Wine of considerable quality may be made from frosted potatoes, if not so much frosted as to become soft and waterish. The potatoes must be crushed or bruised; a wooden mallet answers the purpose. If a plank of wood is made hollow, in the manner of a shallow bowl, they may be bruised with a mallet or put into a cider press. A Winchester bushel must have 10 gallons of water, prepared by boiling it mixed with half a pound of hops and half a pound of common white ginger. This water, after having boiled for about half an hour, must be poured upon the bruised potatoes, into a tub or vessel suited to the quantity to be made. After standing in this mixed state for three days, yeast must be added, to ferment the liquor. When the fermentation has subsided, the liquor must be drawn off, as pure as possible, into a cask, adding half a pound of raw sugar for every gallon. After it has remained in the cask for three months, it will be ready for use. *Farmers' Mag.* 1816.

Ginger wine.

Take of cold soft water, 19 gallons,—Malaga raisins, 50 lbs.—white tartar, in powder, 4 oz. Ferment. Mix ginger, in powder or bruised, 20 oz.—18 lemons, peel and juice.

Add brandy, 2 quarts, or more. This will make 18 gallons.

Another.

Take 20 quarts of water,—5 lbs. of sugar,—3 oz. of white ginger,—1 oz. of stick liquorice. Boil them well together; when it is cold put a little new yeast upon it, but not too much; then put it into the barrel for 10 days, and after that bottle it, putting a lump of white sugar into every bottle.

Another.

To seven gallons of water put 19 pounds of clayed sugar, and boil it for half an hour, taking off the scum as it rises; then take a small quantity of the liquor, and add to it 9 ounces of the best ginger bruised. Now put it all together, and when nearly cold, chop 9 pounds of raisins very small, and put them into a nine gallon cask (beer measure,) with one ounce of isinglass. Slice 4 lemons into the cask, taking out all the seeds, and pour the liquor over them, with half a pint of fresh yeast. Leave it unstopped for three weeks, and in about three months it will be fit for bottling.

There will be one gallon of the sugar and water more than the cask will hold at first: this must be kept to fill up, as the liquor works off, as it is necessary that the cask should be kept full, till it has done working. The raisins should be two-thirds Malaga, and one-third Muscadel. Spring and autumn are the best seasons for making this wine.

To make koumiss, a Tartar wine.

Take of fresh mare's milk any quantity; add to it a sixth part of water, and pour the mixture into a wooden vessel. Use as a ferment an eighth part of skimmed milk; but at any future preparation a small portion of old koumiss will answer better. Cover the vessel with a thick cloth, and set it in a place of moderate warmth; leaving it at rest for twenty-four hours: at the end of which time the milk will become sour, and a thick substance will be gathered on its top. Now with a churn staff, beat it till the thick substance above-mentioned be blended intimately with the subjacent fluid. In this situation, leave it at rest for twenty-four hours more; after which, pour it into a higher and narrower vessel, resembling a churn, where the agitation must be repeated as before, till the liquor appears to be perfectly homogeneous. In this state it is called koumiss; of which the taste ought to have been a pleasant mixture of sweet and sour. Agitation must be employed every time before it is used. This wine is cooling and antiseptic. Sometimes aromatic herbs, as Angelica, are infused in the liquor during fermentation.

To make rhubarb wine.

Take of sliced rhubarb, 2 1-2 oz.—lesser cardamon seeds, bruised and husked, 1-2 oz.—saffron, 2 drachms,—Spanish white wine, 2 pints,—proof spirit, 1-2 pint. Digest for ten days, and strain. This is a warm, cordial, laxative medicine. It is used chiefly in weakness of the stomach and bowels, and some kinds of looseness, for evacuating the offending matter, and strengthening the tone of the vicera. It may be given in doses of from half a spoonful to three or four spoonsful or more, according to the circumstances of the disorder, and the strength of the patient.

To make sage wine.

Boil 26 quarts of spring water a quarter of an hour, and when it is blood warm, put 25 pounds of Malaga raisins, picked, rubbed, and shred, into it, with almost half a bushel of red sage shred, and a porringer of ale yeast; stir all well together, and let it stand in a tub, covered warm, six or seven days, stirring it once a day; then strain it off, and put it in a runlet. Let it work three or four days, and then stop it up; when it has stood six or seven days, put in a quart or two of Malaga sack; and when it is fine bottle it.

To make galliflower wine.

To three gallons of water put 6 pounds of the best powder sugar, boil the sugar and water together for the space of half an hour, keep skimming it as the scum rises; let it stand to cool, beat up three ounces of syrup of betony with a large spoonful of ale yeast, put it into the liquor, and brew it well together; then having a peck of gilliflowers, cut from the stalks, put them into the liquor, let them infuse and work together three days, covered with a cloth; strain it, and put it into a cask, and let it settle for three or four weeks; then bottle it.

To make turnip wine.

Pare and slice a number of turnips, put them into a cider press, and press out all the juice. To every gallon of the juice, add three pounds of lump sugar; have a vessel ready large enough to hold the juice, and put half a pint of brandy to every gallon. Pour in the juice and lay something over the bung for a week, to see if it works; if it does, do not bung it down till it has done working; then stop it close for three months, and draw it off into another vessel. When it is fine, bottle it off.

This is an excellent wine for gouty habits, and is much recommended in such cases in lieu of any other wine.

Rose wine.

Take a well glazed earthen vessel, and put into it 3 gallons of rose-water drawn with a cold still. Put into that a sufficient quantity of rose leaves, cover it close, and set it for an hour in a kettle or copper of hot water, to take out the whole strength and tincture of the roses; and when it is cold, press the rose leaves hard into the liquor, and steep fresh ones in it, repeating it till the liquor has got the full strength of the roses. To every gallon of liquor put three pounds of loaf sugar, and stir it well, that it may melt and disperse in every part. Then put it into a cask, or other convenient vessel, to ferment, and put into it a piece of bread toasted hard, and covered with yeast. Let it stand about thirty days, when it will be ripe, and have a fine flavour, having the whole strength and scent of the roses in it; and it may be greatly improved by adding to it wine and spices. By this method of infusion, wine of carnations, clove gilliflowers, violets, primroses, or any other flower, having a curious scent, may be made.

Barley wine.

Boil half a pound of fresh barley in 3 waters, and save 3 pints of the last water. Mix it with a quart of white wine, half a pint of borage water, as much clary water, a little red rose-water, the juice of 5 or 6 lemons, 3 quarters of a pound of fine sugar, and the thin yellow rind of a lemon. Mix all these well together, run it through a strainer, and bottle it. It is pleasant in hot weather, and very good in fevers.

English fig wine.

Take the large blue figs, when pretty ripe, and steep them in white wine, having made some slits in them, that they may swell and gather in the substance of the wine. Then slice some other figs, and let them simmer over a fire in water until they are reduced to a kind of pulp. Then strain out the water, pressing the pulp hard, and pour it as hot as possible on the figs that are imbrewed in the wine. Let the quantities be nearly equal, but the water somewhat more than the wine and figs. Let them stand 24 hours, mash them well together, and draw off what will run without squeezing. Then press the rest, and if not sweet enough, add a sufficient quantity of sugar, to make it so. Let it ferment, and add to it a little honey and sugar-candy; then fine it with whites of eggs, and a little isinglass and draw it off for use.

Sycamore wine.

Boil 2 gallons of the sap half an hour, and then add to it 4 pounds of fine powdered sugar. Beat the whites of 3 eggs to froth, and mix them with the liquor; but take care that it is not too hot, as that will poach the eggs. Skim it well, and boil it half an hour. Then strain it through a hair sieve, and let it stand till next day. Then pour it clean from the sediment, put half a pint of yeast to every twelve gallons, and cover it close up with blankets. Then put it into the barrel, and leave the bunghole open till it has done working. Then close it up well, and after it has stood 2 months, bottle it. The fifth part of the sugar must be loaf; and if raisins are liked, they will be a great addition to the wine.

Balm wine.

Take 40 pounds of sugar and 9 gallons of water, boil it gently for 2 hours, skim it well, and put it into a tub to cool. Take 2 pounds and a half of the tops of balm, bruise them, and put them into a barrel, with a little new yeast; and when the liquor is cold, pour it on the balm. Stir it well together, and let it stand 24 hours, stirring it often. Then close it up, and let it stand 6 weeks. Then rack it off and put a lump of sugar into every bottle. Cork it well, and it will be better the second year than the first.

To make scurvy-grass wine.

Scurvy-grass, or spoonwort, is a very sovereign medicinal herb, appropriated chiefly to the health of invalids.

Take the best large scurvy-grass tops and leaves, in May, June, or July, bruise them well in a stone mortar, then put them in a well glazed earthen vessel, and sprinkle them over with some powder of crystal of tartar, then smear them with virgin honey, and being covered close, let it stand 24 hours; then set water over a gentle fire, putting to every gallon 3 pints of honey, and when the scum rises, take it off, and let it cool; then put the stamped scurvy grass into a barrel, and pour the liquor to it, setting the vessel conveniently endways, with a tap at the bottom. When it has been infused 24 hours, draw off the liquor, strongly press the juice and moisture out of the herb into the barrel or vessel, and put the liquor up again; then put a little new yeast to it, and suffer it to ferment 3 days, covering the place of the bung or vent with a piece of bread spread over with mustard seed, downward, in a cool place, and let it continue till it is fine and drinks brisk; then draw off the finest part, leaving only the dregs behind: afterwards add more herbs, and ferment it with whites of eggs, flour, and fixed nitre, verjuice, or the juice of green grapes, if they are to be had; to which add 6 pounds of the syrup of mustard, all mixed and well beaten together, to refine it down, and it will drink brisk, but it is not very pleasant; being here inserted among artificial wines rather for the sake of health than for the delightfulness of its taste.

To make cheap and wholesome claret.

Take a quart of fine draft Devonshire cider, and an equal quantity of good port. Mix them, and shake them. Bottle them, and let them stand for a month. The best judge will not be able to distinguish them from good Bordeaux.

To make dry wine.

Those who like a dry wine, should put into the vat at the commencement of the vinous fermentation, an ounce or two of calcined gypsum, in fine powder.

MANAGEMENT OF BRITISH WINES.

To guard against unripe fruit.

If the season proves bad so that some fruits are not sufficiently ripe, immediately after the vinous fermentation, and the *must* of such fruit is put into the cask, it is to be rolled two or three times a day, for a week or two. A spirituous fermentation will soon commence, the bung of the cask must then be taken out, and the hole covered with a bit of light wood or canvass, and as any scum arises, it should be taken away. When the scum disappears, fill up the cask, and bung it up. But a vent-hole must be left open for a week.

To keep and manage wines.

Wines will diminish, therefore the cask must be kept filled up with some of the same wine, or some other that is as good or better.

They must at all times be kept in a cool cellar, if not, they will ferment. If wines are kept in a warm cellar, an acetous fermentation will soon commence, and the result consequently will be vinegar. The more a wine frets and ferments, the more it parts with its strength and goodness; when wines are found to work improperly in the cellar, the vent-peg must be taken out for a week or two.

If any wine ferments, after being perfected, draw off a quart and boil it, and pour it hot into the cask, add a pint or a quart of brandy, and bung up a day or two after.

Or, draw off the wine, and fumigate the cask, with one ounce of flower of brimstone, and half an ounce of cinnamon, in powder. Mix the two together, and tie them up in a rag. Turn the bung-hole of the cask downwards, place the rag under the bung-hole, and set fire to it, so that the gas ascends into the cask. As soon as it is burnt out, fill up the cask with wine, and bung it up tight.

To sweeten a foul cask.

Set fire to a pound or more of broken charcoal, put it into the cask and immediately fill up the cask with boiling water. After this, roll the cask once or twice a day for a week; then pour out the charcoal and water, wash out the cask with clean cold water, and expose it to the external air for some days.

To improve poor wines.

Poor wines may be improved by being racked off, and returned into the cask again; and then putting into the wine about a pound of jar or box raisins, bruised, and a quart of brandy.

Or, put to the wine two pounds of honey, and a pint or two of brandy. The honey and brandy to be first mixed together.

Or, draw off three or four quarts of such wine, and fill the cask up with strong wine.

To improve wine when lowering or decaying.

Take one ounce of roche-alum, make it into powder; then draw out four gallons of wine, mix the powder with it, and beat it well for half an hour; then fill up the cask, and when fine (which will be in a week's time or little more,) bottle it off. This will make it drink fine and brisk.

To restore flat wines.

Flat wines may be restored by one pound of jar raisins, one pound of honey, and half a pint of spirit of wine, beaten up in a mortar with some of the wine, and then the contents put into the cask.

To remove a musty or disagreeable taste in wine.

Put into the cask three or four sticks of charcoal, and bung up the cask tight. In a month after take them out.—Or, cut two ripe medlars, put them in a gauze bag, and suspend them from the bung-hole into the wine, and bung up the cask air-tight. A month after take them out, and bung up the cask again. Or, mix half a pound of bruised mustard-seed, with a pint or more of brandy, and stir it up in the wine, and two days after bung up the cask.

Another mode.—At the finish of the process, when the brandy or spirit is put to the wine, it is particularly recommended that a quarter of an ounce of crystal camphor, in the lump, be dropped into the bung-hole of each eighteen gallons of wine.

Another mode.—Oil poured upon wine, or any other liquor, will prevent it from growing musty, or turning corrupt.

To take away the ill scent of wines.

Bake a long roller of dough, stuck well with cloves, and hang it in the cask.

To pass white wine off for Champaign.

Rack it often from the lees: and when very brilliant, bottle it off: this must be done between vintage time and the month of May.

It has (says Mr. Carnel) been a most absurd practice with many families to use green gooseberries in order to imitate Champaign wine; but green fruit is, by no means, fit or proper for the making of any wine. Nor indeed, is it at all necessary in making an imitation of Champaign.

To make wine sparkle like Champaign.

Take great care to rack off the wine well, and in March bottle it as quick as possible. The bottles must be very clean and dry, and the corks of the best sort, made of velvet or white cork. In two months after, the wine will be in a fine condition to drink.

To clear foul or ropy wines.

Take 1-2 ounce of chalk in powder,—1-2 an ounce of burnt alum,—the white of an egg, and one pint of spring water.

Beat the whole up in a mortar, and pour it into the wine; after which roll the cask ten minutes; and then place it on the stand, leaving the bung out for a few days. As soon as the wine is fine, rack it off.

Or, take one ounce of ground rice, 1-2 oz. of burnt alum, and 1-2 oz. of bay salt.

Beat the whole up in a mortar, with a pint or more of the wine, pour it into the cask, and roll it ten minutes. The cask must not be bunged up for a few days. As soon as such wine becomes fine, rack it off.

Or, bring the cask of wine out of the cellar, and place it in a shady situation to receive the circulation of the air; and take out the bung. In three weeks or a month rack it off into a sweet cask, which fill up, and put into the wine an ounce of cinnamon, in the stick; and bung it up tight.

Another method.

Tap the cask, and put a piece of coarse linen cloth upon that end of the cock which goes to the inside of the cask;—then rack it into a dry cask to 30 gallons of wine, and put in 5 ounces of powdered alum. Roll and shake them well together, and it will fine down, and prove a very clear and pleasant wine.

To correct green or harsh wine.

Take 1 oz. of salt,—1-2 oz. calcined gypsum, in powder, and 1 pint of skimmed milk.

Mix those up with a little of the wine, and then pour the mixture into the cask: put in a few lavender leaves, stir the wine with a stick, so as not to disturb the lees, and bung it up.

To correct sharp, tart, acid wines.

Mix 1 oz. of calcined gypsum in powder, and 2 pounds of honey, in 1 quart of brandy; pour the mixture into the wine, and stir it so as not to disturb the lees; fill up the cask, and the following day bung it up:—rack this wine as soon as fine.

Or, mix 1-2 oz. of the salt of tartar, 1-2 oz. of calcined gypsum, in powder, with a pint of the wine; pour it into the cask, and put an ounce of cinnamon in the stick; stir the wine without disturbing the lees, fill up the cask, and the day following bung it up.

Or, boil 3 oz. of rice, when cold put it into a gauze-bag, and immerge it into the wine; put into the wine also a few sticks of cinnamon, and bung up the cask. In about a month after, take the rice out.

To restore sour wine.

Take calcined gypsum, in powder, 1 oz.—cream of tartar, in powder, 2 oz.

Mix them in a pint or more of brandy; pour it into the cask; put in, also, a few sticks of cinnamon, and then stir the wine without disturbing the lees. Bung up the cask the next day.

Another method.

Boil a gallon of wine, with some beaten oyster-shells and crab's claws, burnt into powder, an ounce of each to every ten gallons of wine; then strain out the liquor through a sieve, and when cold, put it into wine of the same sort, and it will give it a pleasant lively taste. A lump of unslaked lime put into the cask will also keep wine from turning sour.

To fine or clarify wines.

Boil a pint of skimmed milk; when cold, mix with it an ounce of chalk in fine powder, pour it into the cask, and roll it ten minutes. The following day, bung up the wine, and rack it off as soon as fine.

Or, take 1 1-2 oz. of gum arabic, in fine powder, and 1 oz. of chalk in powder.

Mix those up with a pint more of wine, pour the mixture into the cask, roll it ten minutes, and then fill it up. Bung it up the next day, and rack off the wine as soon as fine.

Or, take the yolk and white of an egg, 1-2 oz. of chalk, in powder, and 1-2 oz. of burnt alum, in powder.

Beat those up in a mortar with a pint of spring water, and pour the mixture into the wine, roll the cask; then fill it up, and bung it up the next day.—Rack off the wine as soon as fine.

To sweeten wines.

In 30 gallons of wine infuse a handful of the flowers of clary: then add a pound of mustard seed, dry ground; put it into a bag and sink it to the bottom of the cask.

To stop the fermentation of wine.

It is in the first place necessary to consider whether the existing state of fermentation be the original or secondary stage of that process which comes on after the former has ceased for several days, and is indeed the commencement of acetous fermentation. That of the former kind rarely proceeds beyond what is necessary for the perfect decomposition of the saccharine and other parts of the vegetable substances necessary for the production of spirit, unless the liquor be kept too warm; or is too weak, and left exposed to the air after the vinous fermentation is completed. The means to correct these circumstances are sufficiently obvious. The heat for spirituous fermentation should not be above 60 degrees Fahrenheit; when it is much above that point, the liquor passes rapidly through the stage of vinous fermentation, and the acetous immediately commences. When too long-continued fermentation arises from the liquor having been kept in a warm situation, it will be soon checked by bunging, after being removed into a cold place; the addition of a small proportion of spirits of wine or brandy, previously to closing it up, is also proper. A degree of cold, approaching to the freezing point, will check ferrmentation of whatever kind. Fermentation of this kind cannot be stopped by any chemical agent, except such as would destroy the qualities of the liquor intended to be produced.

The secondary stage of fermentation, or the commencement of the acetous, may be stopped by removing the liquor to a cool situation; correcting the acid already formed; and if the liquor contain but little spirit, the addition of a proper proportion of brandy is requisite.

The operation of racking is also necessary to preserve liquor in a vinous state, and to render it clear. This process should be performed in a cool place.

To restore pricked British wines.

Rack the wines down to the lees into another cask, where the lees of good wines are fresh: then put a pint of strong aqua vitæ, and scrape half a pound of yellow bees'-wax into it, which by heating the spirit over a gentle fire, will melt; after which dip a piece of cloth into it, and when a little dry, set it on fire with a brimstone match, put it into the bung-hole, and stop it up close.

Another method.

First prepare a fresh empty cask, that has had the same kind of wine in it which is about to be racked, then match it, and rack off the wine, putting to every ten gallons two ounces of oyster powder, and half an ounce of bay salt, then get the staff and stir it well about, letting it stand till it is fine, which will be in a few days; after which rack it off into another cask, (previously matched) and if the lees of some wine of the same kind can be got, it will improve it much.—Put likewise a quart of brandy to every ten gallons, and if the cask has been emptied a long time, it will match better on that account; but if even a new cask, the matching must not be omitted. A fresh empty cask is to be preferred.

This method will answer for all made wines.

To manage foreign wine vaults.

The principal object to be attended to in the management of foreign wine vaults, is to keep them of a temperate heat. Care must be taken, therefore, to close up every aperture or opening, that there may be no admission given to the external air. The floor of the vault should likewise be well covered with saw-dust which must not be suffered to get too dry and dusty, but must receive now and then an addition of new, lest, when bottling or racking wine, some of the old dust should fly into it. At most vaults, in the winter, it is necessary to have a stove or chafing-dish, to keep up a proper degree of warmth. In the summer time it will be best to keep them as cool as possible.

To fit up a cellar of wines and spirits.

Provide a good rope and tackling, to let down the casks into the vaults or cellar, and a slide, ladder, or pulley for the casks to slide or roll on; a pair of strong slings; a pair of can hooks and a pair of crate hooks; a block of wood to put under the pipes when topping them over in a narrow passage, or in casing them; a small valinch to taste wines; a crane, and a small copper pump to rack off; two or three gallon cans, made of wood; a large wooden funnel; two or three copper funnels from a quart to a gallon each; two racking cocks; two wine bottlling cocks; a brace and various bits; two small tubs; a square basket to hold the corks; two small tin funnels; a small strainer; two cork screws; two or three baskets; a whisk to beat the finings; three flannel or linen bags; a strong iron screw to raise the bungs; a pair of pliers; bungs, corks, and vent pegs; two frets or middle sized gimblets; some sheet lead and tacks to put on broken staves; brown paper to put round cocks and under the lead, when stopping leaks; a staff with a chain at one end to rumage the wines, &c.; shots and lead canister, or bristle brush, and two cloths to wash bottles; two large tubs; some small racks that will hold six dozen each; a cooper's adze; an iron and a wooden driver to tighten hoops; two dozen of wooden bungs of different sizes; a thermometer, which is to be kept in the vault, a stove or chafingdish, to keep the heat of the vault to a known temperature; a few dozen of delph labels; a cupboard to hold all the tools; a spade, two good stiff birch brooms, and a rake to level the saw dust.

Process of foreign wine making.

When the grapes are ripe, and the saccharine principle is developed, they are then pressed, and the juice which flows out is received in vessels of a proper capacity, in which the fermentation appears, and proceeds in the following manner. At the end of several days, and frequently after a few hours, according to the heat of the atmosphere, the nature of the grapes, the quantity of the liquid, and the temperature of the place in which the operation is performed, a movement is produced in the liquor, which continually increases; the volume of the fluid increases; it becomes turbid and oily; carbonic acid is discharged, which fills all the unoccupied part of the vessel, and the temperature rises to the 72-5th degree. At the end of several days these tumultuous motions subside, the mass falls, the liquor becomes clearer, and is found to be less saccharine, more odorant, and of a red colour, from the re-action of the ardent spirit upon the colouring matter of the pellicle of the grape.

The wine is usually taken out of the fermenting vessel at the period when all the phenomena of fermentation have subsided. When the mass is settled, the colour of the liquor is well developed; when it has become clear, and its heat has disappeared, it is put into casks, where by second insensible fermentation, the wine is clarified, its principles combine more perfectly together, and its taste and smell become more and more developed. If this fermentation be stopped or suffocated, the gaseous principles are retained, and the wine is brisker, and more of the nature of *must*.

To make port wine.

The dark red port is made from grapes gathered indiscriminately, and thrown into a cistern; they are then trod, and their skins and stalks left in the mass, which separate during fermentation, and form a dry head over the liquid. When the fermentation is completed, the liquor underneath is drawn out, and casked. Before being brought to England it is mixed with one third of brandy to enable it to keep during the voyage; otherwise the carriage brings on the acetous fermentation, and the wine is converted into vinegar.

French method of making wines.

In the southern parts of France, their way is with red wines to tread or squeeze the grapes between the hands, and let the whole stand, juice and husks, till the tincture be to their likings; after which they press it. For white wines, they press the grapes immediately, and when pressed, they tun the *must* and stop up the vessel, leaving only the depth of a foot or more to give room for it to work. At the end of ten days they fill this space with some other good wine, that will not work it again.

To rack foreign wines.

The vaults or cellar should be of a temperate heat, and the casks sweet and clean. Should they have an acid or musty smell, it may be remedied by burning brimstone matches in them; and if not clean, rinse them well out with cold water, and after draining, rinse with a quart of brandy, putting the brandy afterwards into the ullage cask. Then strain the lees or bottoms through a flannel or linen bag. But put the bottoms of port into the ullage cask without going through the filtering bag. In racking wine that is not on the stillage, a wine pump is desirable.

To manage and improve poor red port.

If wanting in body, colour, and flavour, draw out thirty or forty gallons, and return the same quantity of young and rich wines. To a can of which put three gills of colouring, with a bottle of wine or brandy. Then whisk it well together, and put it into the cask, stirring it well. If not bright in about a week or ten days, fine it for use; previous to which put in at different times a gallon of good brandy. If the wine is short of body, put a gallon or two of brandy in each pipe, by a quart or two at a time, as it feeds the wine better than putting it in all at once. But if the wines are in a bonded cellar, procure a funnel that will go to the bottom of the cask, that the brandy may be completely incorporated with the wine.

To manage claret.

Claret is not a wine of a strong body, though it requires to be of a good age before it is used, and therefore it should be well managed; the best method is to feed it every two or three weeks with a pint or two of French brandy. Taste it frequently, to know what state it is in, and use the brandy accordingly, but never put much in at a time, while a little incorporates with the wine, and feeds and mellows it.

If the claret is faint, rack it into a fresh-emptied hogshead, upon the lees of good claret; and bung it up, putting the bottom downwards for two or three days, that the lees may run through it.

To colour claret.

If the colour be not yet perfect, rack it off again into a hogshead that has been newly drawn off, with the lees; then take a pound of turnsole, and put it into a gallon or two of wine; let it lie a day or two, and then put it into the vessel; after which lay the bung downwards for a night, and the next day roll it about.

Or, take any quantity of damsons or black sloes, and strew them with some of the deepest coloured wine and as much sugar as will make it into a syrup. A pint of this will colour a hogshead of claret. It is also good for red port wines, and may be kept ready for use in glass bottles.

To restore claret that drinks foul.

Rack it off from the dregs on some fresh lees of its own kind, and then take a dozen of new pippins, pare them, and take away the cores or hearts: then put them in the hogshead, and if that is not sufficient, take a handful of the oak of Jerusalem, and bruise it; then put it into the wine, and stir it well.

To make claret and port rough.

Put in a quart of claret or port two quarts, of sloes; bake them in a gentle oven, or over a slow fire, till a good part of their moisture is stewed out, then pour off the liquor, and squeeze out the rest. A pint of this will be sufficient for 30 or 40 gallons.

To recover pricked foreign wines.

Take a bottle of red port that is pricked, add to it half an oz of tartarized spirit of wine, shake the liquor well together, and set it by for a few days, and it will be found much altered for the better. If this operation be dexterously performed, pricked wines may be absolutely recovered by it, and remain saleable for some time; and the same method may be used to malt liquors just turned sour.

To manage Hermitage and Burgundy.

Red hermitage must be managed in the same way as claret, and the white likewise, except the colouring, which it does not require. Burgundy should be managed in the same manner as red hermitage.

To manage Lisbon wine.

If the Lisbon is dry, take out of the pipe thirty-five or forty gallons, and put in the same quantity of calcavella, stir it well about, and this will make a pipe of good mild Lisbon: or, if it be desired to convert mild into dry, take the same quantity out as above mentioned before, and fill the pipe with Malaga Sherry, stirring it about as the other. The same kind of fining used for vidonia will answer for Lisbon wines; or it may be fined with the whites and shells of sixteen eggs, and a small handful of salt; beat it together to a froth, and mix it with a little of the wines: then pour it into the pipe, stir it about, and let it have vent for three days; after which bung it up, and in a few days it will be fine. Lisbon when bottled, should be packed either in saw-dust or leaths in a temperate place.

To manage Bucella wine.

In fining, it proceed in the same way as with the Madeira; only observe, that if not wanted very pale, keep the milk out of the finings. This tender wine should be fed with a little brandy, for if kept in a place that is either too hot or too cold, it will be in danger of turning foul.

To improve Sherry.

If the Sherry be new and hot, rack it off into a sweet cask, add five gallons of mellow Lisbon, which will take off the hot taste, then give it a head, take a quart of honey, mix it with a can of wine, and put it into the cask when racking. By this method Sherry for present use will be greatly improved, having much the same effect upon it as age.

To improve white wine.

If the wine have an unpleasant taste, rack off one half, and to the remainder add a gallon of new milk, a handful of bay salt, and as much rice; after which, take a staff, beat them well together for half an hour, and fill up the cask, and when rolled well about, stillage it, and in a few days it will be much improved.

If the white wine is foul and has lost its colour, for a butt or pipe take a gallon of new milk, put it into the cask, and stir it well about with a staff; and when it has settled, put in three ounces of isinglass made into a jelly, with a quarter of a pound of loaf sugar scraped fine, and stir it well about. On the day following, bung it up, and in a few days it will be fine and have a good colour.

To improve wine by chalk.

Add a little chalk to the *must*, when it is somewhat sour; for the ascidity arising from citric and tartaric acids, there is thus formed a precipitate of citrate and tartrate of lime, while the *must* becomes sweeter, and yields a much finer wine. Too much chalk may render the wine insipid, since it is proper to leave a little excess of acid in the *must*. Concentrate the *must* by boiling, and add the proper quantity of chalk to the liquor, while it is still hot. Even acid wine may be benefited by the addition of chalk. Oyster-shells may be used with this view; and when calcined are a cleaner carbonate of lime than common chalk.

To renovate sick wine.

Wines on the fret should be racked; if their own lee indicates decay they should be racked on the sound lee of another wine of similar but stronger quality, to protract their decline: if this be done at an early period, it may renovate the sick wine; on these occasions giving the sick wine a cooler place, will retard its progress to acidity; if convenient, such wines should be forced and bottled. Previous to bottling, or rather at the forcing, give it one, two, or three table-spoonsful of calcined gypsum finely pulverized. This will check its tendency to acidity, without exciting much intumescence, without injuring the colour of the red wine, and without retarding its coating to the bottle, which it rather promotes. The proper forcing for red wines are, the whites of ten or twelve eggs, beat up with one or two tea-spoonsful of salt per hogshead, and well worked into the wine with a forcing-rod; the gypsum should be first boiled in a little water. This is intended to check the acetous process. To retard the vinous, the French are in the habit of burning sulphur immediately under the cask, and possibly the sulphuric acid evolved by the combustion may check its progress and prevent the necessity of an *admixture*.

To mellow wine.

Cover the orifices of the vessels containing it with bladder closely fastened instead of the usual materials, and an aqueous exhalation will pass through the bladder, leaving some fine crystallizations on the surface of the wine, which, when skimmed off, leaves the wine in a highly improved state of flavour. Remnants of wine covered in this manner, whether in bottles or casks, will not turn mouldy as when stopped in the usual way, but will be improved instead of being deteriorated.

German method of restoring sour wines.

Put a small quantity of powdered charcoal in the wine, shake it, and after it has remained still for forty-eight hours, decant steadily.

To concentrate wines by cold.

If any kind of wine be exposed to a sufficient degree of cold in frosty weather, or be put into any place where ice continues all the year, as in ice-houses, and there suffered to freeze, the superfluous water contained in the wine will be frozen into ice, and will leave the proper and truly essential part of the wine unfrozen, unless the degree of cold should be very intense, or the wine but weak and poor. When the frost is moderate, the experiment has no difficulty, because not above a third or a fourth part of the superfluous water will be frozen in a whole night; but if the cold be very intense, the best way is, at the end of a few hours, when a tolerable quantity of ice is formed, to pour out the remaining fluid liquor, and set it in another vessel to freeze again by itself.

The frozen part, or ice, consists only of the watery part of the wine, and may be thrown away, and the liquid part retains all the strength, and is to be preserved. This will never grow sour, musty, or mouldy, and may at any time be reduced to wine of the common strength, by adding to it as much water as will make it up to the former quantity.

To fine white wines.

Take an ounce of isinglass, beat it into thin shreads with a hammer, and dissolve it, by boiling in a pint of water: this, when cold, becomes a stiff jelly. Whisk up some of this jelly into a froth with a little of the wine intended to be fined, then stir it well among the rest in the cask, and bung it down tight; by this means the wine will become bright in eight or ten days.

To fine red wines.

Take whites of eggs beat up to a froth, and mix in the same manner as in white wines.

Another method.—Put the shavings of green beech into the vessel, having first taken off all the rind, and boil them for an hour in water to extract their rankness, and afterwards dry them in the sun, or in an oven. A bushel serves for a tun of wine; and being mashed, they serve again and again.

Mortimer recommends to gather the grapes when very dry, pick them from the stalks, press them, and let the juice stand twenty-four hours in a covered vat. Afterwards to draw it off from the gross lees, then put it up in a cask, and to add a pint or quart of strong red or white port to every gallon of juice, and let the whole work, bung it up close, and letting it stand till January; then bottling it in dry weather.

Bradley chooses to have the liquor, when pressed, stand with the husks and stalks in the vat, to ferment for fifteen days.

To fine a hogshead of Claret.

Take the whites and shells of six fresh eggs, and proceed as with port finings. Claret requires to be kept warm in saw-dust when bottled.

To fine Sherry.

Take an ounce and a half of isinglass, beat it with a hammer till it can be pulled into small pieces, then put it into three pints of cider or perry, and let it remain twenty-four hours, till it becomes a jelly. After which mix it with a quart or two of wine, and whisk it well with the whites and shells of six fresh eggs. Take four or five gallons out to make room for the finings, and stir the wine well. Then nearly fill the can of finings with wine, wisk it well, and put it in the butt, stirring it well for about five minutes; afterwards fill it up, and put the bung in loose. In two days bung it up, and in eight or ten it will be fit for bottling.

To fine pale Sherry.

Put three pints of skim-milk with the whites of eight eggs, beat well together in a can; then put in finings, in the same manner as for common sherry. If the sherry be thin and poor, feed them with good brandy, as other wines.

To fine Madeira.

Take three ounces of isinglass, and dissolve it, but if old wine two ounces will be enough, also one quart of skim-milk, and half a pint of marble sand; whisk these in a can with some wine. If the pipe is full, take out a canful, and stir the pipe well; then put in the can of finings, and stir that with a staff for five minutes; after which put the other can of wine into it and let it have vent for three days. Then close it up, and in ten days or a fortnight it will be fine and fit for bottling and stowing with saw-dust in a warm place.

To improve Madeira which has been round to the Indies.

Madeira should be kept in a warmer place than port wine, and therefore requires a good body, and to be fed with brandy, but if deficient in flavour or mellowness, add to it a gallon or two of good Malmsey.

To fine Vidonia wine.

When first imported, Vidonia has a harsh and acid taste; but if properly managed it more resembles Madeira wine than any other. To take off the harshness, fine it down, and then rack it off upon the lees of Madeira or white port, fining it again with a light fining; and if 20 or 30 gallons of good Madeira wine be added, it will pass for Madeira. For the finings, dissolve 2 ounces of isinglass, and the whites and shells of 6 fresh eggs; beat them well up together, with a wisk and add a gill of marble sand.

To fine Malmsey and other wines.

Take 20 fresh eggs, beat the whites, yolks, and shells together, and manage it the same as other finings.—Calcavella, Sweet Mountain, Paxaretta, and Malaga, should be managed and fined in the same manner as Lisbon.—Tent, Muscadine, Sack, and Bastard, should be managed the same as Malmsey, and fined with 16 or 20 fresh eggs, and a quart or three pints of skim-milk. Old Hock, and Vin de Grave, are thin but pleasant wines, and should be fed with a little good brandy, and fined, if necessary, with the whites and shells of 6 or 8 eggs.

To fine port wine.

Take the whites and shells of eight fresh eggs, beat them in a wooden can or pail, with a whisk, till it becomes a thick froth; then add a little wine to it, and whisk it again. If the pipe is full, take out four or five gallons of the wine to make room for the finings. If the weather be warmish, add a pint of fresh water sand to the finings. Stir it well about: after which put in the finings, stirring it for five minutes; put in the can of wine, leaving the bung out for a few hours, that the froth may fall: then bung it up, and in eight or ten days it will be fine and fit for bottling.

To make and apply finings.

Put the finings into a can or pail with a little of the liquor about to be fined, whisk them all together till they are perfectly mixed, and then nearly fill the can with the liquor, whisking it well about again; after which, if the cask be full, take out four or five gallons to make room; then take the staff, and give it a good stirring; next whisk the finings up, and put them in; afterwards stir it with the staff for five minutes. Then drive the bung in, and bore a hole with a gimlet, that it may have vent for 3 or 4 days, after which drive in a vent-peg.

To convert white wine into red.

Put four ounces of turnsole rags into an earthen vessel, and pour upon them a pint of boiling water; cover the vessel close, and leave it to cool; strain off the liquor, which will be of a fine deep red inclining to purple. A small portion of this colours a large quantity of wine. This tincture may either be made in brandy, or mixed with it, or else made into a syrup, with sugar, for keeping.

In those countries which do not produce the tinging grape which affords a blood-red juice, wherewith the wines of France are often stained, in defect of this, the juice of elderberries is used, and sometimes log-wood is used at Oporto.

To force down the finings of all white wines, arracks, and small spirits.

Put a few quarts of skimmed milk into the cask.

To render red wine white.

If a few quarts of well-skimmed milk be put to a hogshead of red wine, it will soon precipitate the greater part of the colour, and leave the whole nearly white; and this is of known use in the turning red wines, when pricked, into white; in which a small degree of acidity is not so much perceived.

Milk is, from this quality of discharging colour from wines, of use also to the wine-coopers, for the whitening of wines that have acquired a brown colour from the cask, or from having been hastily boiled before fermenting; for the addition of a little skimmed milk, in these cases, precipitates the brown colour, and leaves the wines almost limpid, or of what they call a water whiteness, which is much coveted abroad in wines as well as in brandies.

To preserve new wine against thunder.

Thunder will turn and often change wines. Cellars that are paved, and the walls of stone, are preferable to boarded floors. Before a tempest of thunder, it will be advisable to lay a plate of iron upon the wine-vessels.

To make wine settle well.

Take a pint of wheat, and boil it in a quart of water, till it burst and become soft; then squeeze it through a linen cloth, and put a pint of the liquor into a hogshead of unsettled white wine; stir it well about, and it will become fine.

To make a match for sweetening casks.

Melt some brimstone, and dip into it a piece of coarse linen cloth; of which when cold, take a piece of about an inch broad and five inches long, and set fire to it, putting it into the bung hole, with one end fastened under the bung, which must be driven in very tight: let it remain a few hours before removing it out.

To make oyster powder.

Get some fresh oyster shells, wash them, and scrape off the yellow part from the outside; lay them on a clear fire till they become red hot; then lay them to cool, and take off the softest part, powder it, and sift it through a fine sieve; after which use it immediately, or keep it in bottles well corked up, and laid in a dry place.

To make a filtering bag.

This bag is made of a yard of either linen or flannel, not too fine or close, and sloping, so as to have the bottom of it run to a point, and the top as broad as the cloth will allow. It must be well sewed up the side, and the upper part of it folded round a wooden hoop, and well fastened to it; then tie the hoop in three or four places with a cord to support it; and when used, put a can or pail under it to receive the liquor, filling the bag with the sediments; after it has ceased to run, wash out the bag in three or four clear waters, then hang it up to dry in an airy place, that it may not get musty. A wine dealer should always have two bags by him, one for red, and the other for white wines.

To bottle wine.

When wine is made fine and pleasant, it may be bottled, taking care afterwards to pack it in a temperate place with saw-dust or leaths After which it will not be fit to drink for at least two months. Never use new deal saw dust, as that causes the wine to fret, and often communicates a strong turpentine smell through to the corks to the wine.

To detect adulterated wine.

Heat equal parts of oyster shells and sulphur together, and keep them in a white heat for fifteen minutes, and when cold, mix them with an equal quantity of cream of tartar; put this mixture into a strong bottle with common water to boil for one hour, and then decant into ounce phials, and add 20 drops of muriatic acid to each; this liquor precipitates the least quantity of lead, copper, &c. from wines in a very sensible black precipitate.

To detect alum in wine.

Wine merchants add alum to red wine, to communicate to it a rough taste and deeper colour; but this mixture produces on the system the most serious effects. For the discovery of the fraud in question, adopt the following means:—The wine is to be discoloured by means of a concentrated solution of chlorine; the mixture is to be evaporated until reduced to nearly the fourth of its original volume; the liquor is to be filtered; it then possesses the following properties when it contains alum:—1st. It has a sweetish astringent taste; 2d. it furnishes a white precipitate (sulphate of barytes) with nitrate of barytes, insoluble in water and in nitric acid: 3d. caustic potash rise to a yellowish white precipitate of alumine, soluble in an excess of potash: 4th. the sub-carbonate of soda produces a yellowish white precipitate (sub-carbonate of alumine) decomposable by fire into carbonic acid gas, alumine easily recognizable by its characters.

Another mode.—Add to the wine a sufficient quantity of a strong solution of chlorine water, (oxygenated muriatic acid) until it is changed to a yellow colour: let the precipitate, (composed of the chlorine and the vegeto-animal matter contained in the wine,) which immediately forms, become settled, then filter the liquor, and evaporate it to 1-4th of its volume; it will now, in consequence of the presence of the alum, have an astringent sweetish taste, and will furnish a white precipitate on the addition of nitrate of barytes, which is insoluble in water and in nitric acid. It will give a yellowish white precipitate with pure potass, that is soluble on the addition of an excess of the potass; and a precipitate of the same colour, with the sub-carbonate of soda.

To detect lead and copper in wine, cider, perry, &c.

Put into a crucible 1 oz. of sulphur, and 1 oz. of pure lime; and keep them in a white heat for nearly half an hour; when cold, add 1 ounce of the super-tartrate of potass, and boil the whole in a matrass with some distilled water for half an hour. Decant the supernatant liquor into small phials, adding about 20 or 30 drops of muriatic acid to each. The phials must be well stopped and preserved for use. Lead, copper and other deleterious metals will be precipitated, of a black colour, by this liquid, if poured, in the quantity of only a few drops, into the suspected wine or cider.

Another mode.—Another test for these pernicious metals in wine and cider, exists ready formed in nature. Pour into a glass of suspected wine, cider, or perry, a few drops of Harrowgate water. If any lead, &c. be present, it will fall down in the state of a black precipitate, being combined with the sulphuretted hydrogen by which these waters are impregnated.

Lead is used by many wine-merchants to give an astringency to port-wine; that it, like old port, may appear rough to the tongue. Sometimes they hang a sheet of lead in the cask; at others they pour in a solution of acetate (sugar of lead,) for the purpose of sweetening, as they term it.

To detect lead, corrosive sublimate, and antimony in wines, &c.

Sulphuric acid decomposes them with precipitate that is blackish, when *antimony* is present, but *white* with the two first mentioned: then, let the precipitate be washed with boiling water; if it change not, it is *lead;* if it acquire a yellow colour, it is *mercury.*

Another test for lead in wine.

Whatever quantity of lead resides in wine, may be precipitated by mixing with it a fluid, made by exposing powdered oyster-shells and sulphur, equal quantities, to a white heat for a quarter of an hour; and when the compost is cold, add as much cream of tartar thereto. Put the whole in a strong bottle with common water, and let the liquor boil an hour; pour off the solution into ounce phials, each of which will be sufficient for a cask of wine, and add to each 20 drops of muriatic acid. Every portion of lead it may contain, will be found at the bottom, in the form of a black cindery precipitate. Having collected a sufficient quantity of this precipitate, upon an iron plate, expose it to a heat, and the lead will run off.

Another.—Take a paste of sulphur and iron filings, put it into a phial, and pour on it a small quantity of sulphuric acid. Pass the gas, which will arise, through a bent tube, into a bottle of water, when thus impregnated, it will form a new and improved test for the purpose. When poured into wine which contains litharge, it will render it black and flakey, and occasion a considerable precipitation.

DISTILLATION.

The object of distillation is the preparation of alcohol or pure spirit, which is obtained from brandy, rum, arrack, and whiskey, prepared from wine, sugar, rice, and malt. It also includes compound spirits, or those which, in addition to alcohol, contain some volatile or pungent oil or essence,—as gin, hollands, caraway, and peppermint. The essential oils, as oil of cinnamon, oil of cloves, oil of peppermint, and otto of roses, and the simple distilled waters, which retain the fragrant flavour of the particular herbs with which they have been distilled.

To manage distillation.

Previous to distilling, the processes of brewing and fermentation are necessary. In distilling, there is only one general rule, namely, to let the heat, in all cases, be as gentle as possible. A water-bath, if sufficiently large, is preferable to any other mode, and will perform the operation with all the dispatch requisite for the most extensive business. The spirit, as it first comes over, should be received into a quantity of cold water; as, by this means, the connexion between it and the oily matter will be considerably lessened. For the same reason, after it has been once rectified in the water-bath, it should be again mixed with an equal quantity of water, and distilled a second time. After the spirit has been distilled, once or twice, in this manner from water, it may be distilled in a water-bath without any addition; and this last rectification will free it from the greater part of the water which it may contain.

In distilling compound spirits, a small still has been found to answer better than a large one.

Utensils.

In a distillery are required a variety of utensils, such as a still, worm-tub, pump, a water-cask, a strong press, hair-cloths, three or four iron-bound tubs, capable of containing from a hogshead to a pipe, of any liquor; three or four cans, capable of holding from two to six gallons by measure, an iron-bound wooden funnel, having a strong iron nosel, or pipe; pewter syphon, about six feet and a half long, and four inches in circumference: flannel bags, for refining the thick and feculent matter at the bottom of the casks and other vessels.

Operation of the still.

When the still is charged, let the fire under it be lighted; and whilst it burns up, the joints should be carefully luted.

By laying the hand on the still and capital, as the fire gains strength, the process of the operation will be ascertained, for, whenever the head, or capital, feels hot, it is a proof that the volatile particles have arisen, and are about to enter the worm. When the still head is about to become hot, prepare a *damp*, made of the ashes under the grate, mixed with as much water as will properly wet them. This mixture is to be thrown upon the fire, to moderate its action, at the instant when distillation has commenced. Continue the heat as long as the distilled liquid is spirituous to the taste. When the distilled liquor carries with it any particular flavour, it should be re-distilled with essential oils, in order to convert it into a compound spirit, as gin, peppermint, and other cordials.

When all the spirituous fluid is drawn off, the still should be emptied by a cock in the side. The head, &c. should then be removed, and the several lutes taken clean off. The still may now be charged a second time, and luted. If the spirits or compound to be made, is of a different nature or flavour from that procured by the last distillation, the still, capital, and worm should be thoroughly cleaned by hot water, sand, and a scrubbing brush, to remove the oily particles which adhere to their internal surfaces. The worm is best cleansed by passing hot water through it repeatedly, until the water flows out quite flavourless.

Great care should be taken that no grease, tallow, soap, or any other unctuous matter, fall into the tubs, pieces, rundlets, or cans.—Above all things, lighted candles, torches, or papers, should not be brought near any vessel containing spirits. The flue or chimney should be kept constantly clean.

To use a portable furnace.

In the laboratories of experimental chemists, portable furnaces are employed. Charcoal is the only fuel that can be used in them, except the occasional use of the finer kinds of stone coal that yield a bright flame, and burn to a white ash without forming clinkers. When the fire is regulated by the admission of only the necessary quantity of air through the charcoal, and the whole heat of the fuel is directed upon the subject exposed to it, the expense is not so great as might be supposed, for no other fuel gives out so much heat. One lb. of charcoal will boil away 13 lbs. of water, whereas the same weight of Newcastle coal will boil away only 8 or 9 lbs. A pound of coke will only boil away 4 lbs of water, and a pound of peat seldom more than 5 lbs. or by a skilful mode of using it at the utmost 10 lbs.

To build fixed furnaces.

Windsor bricks are generally used, as they may be cut as easily as chalk, and yet bear a violent heat without alteration; they must be set in clay of the same field. The parts distant from the fire may be of common bricks set in mortar, but this mortar must be carefully removed before the other part is begun, as an accidental admixture of it with the clay would cause the latter to run into glass, and thus spoil the furnace. These furnaces are generally built as thin as possible that they may take up the less room, and to save fuel in heating them as they have seldom fire constantly in them; in this case, they should be surrounded with iron braces, to prevent the alternate contraction and expansion destroying them as soon as they otherwise would.

To make a portable sand-pot.

For a portable one, the ash pit may be an iron cylinder, 17 inches in diameter and 8 deep, closed at bottom. In the front is cut a hole 3 inches high and 4 wide, with sliders to shut close. Three pins are rivetted on the inside about an inch below the upper edge; these are to support the fire-place. The bottom of this ash pit is lined with clay, beat up with charcoal dust and formed into a kind of saucer. The fire-place is a small cylinder of nearly the same width so as to fit easily into the top of the ash pit, and rest on three pins; its height is 15 inches, and it has a flat border at each end, leaving a circular opening of 10 inches in diameter. Around the lower border are riveted three srews, to which are fixed, by nuts, a grate. In the upper border, towards the circumference, and at equal distances from each other, are made four circular holes an inch over. The inside of the fire-place is lined with clay and charcoal, whose surface is adjusted to a core, made by drawing on a board an ellipsis, having its foci 15 inches asunder, and its semiordinates at the foci 5 inches, sawing off the board at each focus, and also down the greatest diameter, so that the internal cavity may represent an ellipsoid of those dimensions, cut off at the foci. A fire-hole about 6 inches wide and 4 inches and a half high, with the lower limit about 3 inches above the grate, is left in the front to be closed with a lined stopper; both the fire-hole and stopper having a border to retain the lining. When the lining is dry, four openings are cut sloping through it, corresponding to the openings in the upper border, to serve as vents for the burnt air, and to regulate the fire by sliding pieces of tile more or less over them. In the central opening at the top of the fire-place is hung a cast iron pot, either hemispherical, or, which is most usual, cylindrical, about 6 inches deep at the edge, with a rounded bottom, so that the axis is about an inch deeper. The common pots have only a reflected border by which they hang; but the best kind have also an upright edge that rises an inch higher, to which a stone-ware head is fitted; and thus the pot serves for many distillations that require a strong fire. It is usual to cut a notch on one side of the top of the fire place, sloping upwards to the edge of the pot, about 3 inches wide and 2 deep, to admit a low retort to be sunk deeper into the pot, by allowing a passage to its neck.

To make a sand-heat furnace.

A furnace of this kind may be stationary and built of bricks that will stand the fire: and in this case, the ash pit is built about 12 inches high, and has an ash-door opening into it about 6 inches square; a grate is then laid, and a fire-door 6 inches by 8 opens immediately into the fire-place, even with the grate. The fire-place is made cylindrical, 2 inches wider than the sand pot, and about 8 inches deeper, the grate being a square whose side is about two-thirds the internal diameter of the sand-pot. This pot hangs by its border in an iron ring placed at the top of the furnace: we have not yet adopted Teichmeyer's method of sloping the pot. As stone coal is generally used in fixing furnaces, instead of the 4 register holes used as vents in the portable furnaces, only one opening, about as wide as the grate, and 3 inches high, either in the back or on one side, is made to vent the burned air into the chimney. This, however, has the inconveniency, of heating the pot unequally, the side next the vent becoming much the hottest, in spite of the endeavour to equalize the heat by bringing the fire from under the centre of the pot as forward as possible, by raising the wall opposite to the vent perpendicularly, and enlarging it only on the other three sides; sometimes, with the same view, several small vents are made round the pot, leading into the chimney. A notch for the neck of the retort is generally made on one side. As much heat passes through the vent, it is usual to cause the heated air to pass under a large cast iron plate, placed on a border of bricks surrounding a platform of the same materials, and leaving a cavity of about 2 inches and a half deep: at the further end of which, another opening leads into the chimney. On this iron plate, sand is laid to form a sand heat, and thus several operations are carried on at the same time. If that in the sand-pot is finished, and it is desired to keep on those in the sand-heat without interruption, the vessel may be drawn out of the sand, some warm sand thrown on that remaining in the pot, and a fresh vessel with materials introduced. But if this new operation should require the heat to be more gradually exhibited, a pot of thin plate iron, filled with cold sand, containing the vessel, may be partly slid into the heated sand-pot, and, being supported by pieces of brick placed under the edge or otherwise, kept there until it be necessary to increase the heat, when it may be slid down lower until at length it is permitted to reach the bottom of the sand-pot.

To make a hot still.

Portable hot stills should have an ash-pit and fire place exactly similar in dimensions to those used with the sand-pot, or the same furnace may be used with a hot still, if economy and not convenience is the principal object. The copper or tin plate cucurbite will, of course, be 10 inches wide, and about 12 deep, and hang 7 inches within the fire-place. The mouth should be wide, that the water-bath to be occasionally hung within it so as to reach within 3 inches of the bottom, may be the larger. Between this wide neck and the circumference there should be a short pipe, through which the liquor left after distillation may be drawn off by a crane without unluting the vessels; fresh liquor added; or, in distilling with the water bath, the steam may escape. This pipe has a ring round it, that the cork with which it is stopped may be firmly tied down, and like the other joinings be luted; for which purpose slips of paper smeared with flour and water, or common paste, are usually esteemed sufficient; but the best material is bladders rotted in water until they smell extremely offensive and adhere to the fingers when touched, and then worked between the hands into rolls, which are to be applied to the joinings. These small stills have usually a Moor's head that fits both the cucurbite and the water bath, their necks being of equal diameter, and is furnished with a groove round the lower part on the inside to direct the condensed vapour to the nose of the alembick; and this head is sorrounded by a refrigeratory containing cold water, which is not so cumbersome and less expensive than a worm and tub. But the most advantageous way of cooling the vapours is to use a Moor's head without a surrounding refrigeratory, or only a plain bent tube, which should be at least 18 inches long, that the small globules of the boiling liquor which are thrown up near a foot high, should not pass over, and render the distilled liquor unfit for keeping. To this is to be adapted a pewter pipe, about 8 feet feet long if spirit of wine is to be distilled, or shorter for watery liquors, and in both cases 3-4th of an inch in diameter on the inside, inclosed in a tinned plate tube with a funnel. With an adopter of this kind, and the consumption of a pint and a half of water in a minute, or about 9 gallons in an hour, spirit of wine may be distilled at the rate of a gallon by the hour, from one of these portable stills. Another convenience of these straight pipes is, that they may be cleansed in the same manner as a fowling piece.

To make a large still.

If this furnace is fixed, and made of bricks, it may be constructed with a sand-heat like that annexed to the sand-pot: but this is seldom practised, although it would be advantageous for digestions and evaporations with a gentle heat, because the fire is generally kept up at an even height. If the cucurbite is not wanted for distilling, it may be used as a boiler to keep water ready heated for use, and to be drawn off when wanted by a syphon or crane. But these fixed stills are usually furnished with a pipe and cock on a level with the bottom, by which they can be emptied, and have almost always a worm and tub to cool the vapours; the head is usually of that kind which is called a swan's neck.

To extinguish fires in distilleries.

A woollen blanket or rug, hung over a roller in a water butt, is the readiest and best extinguisher.

To dulcify spirits.

In dulcifying, or sweetening the spirits, weigh the sugar, and dissolve it in one or more cans of the water, with which the compound is to be made up: bruise the sugar, and stir it well, till all is dissolved. Then empty it into the cask containing the spirits; mixing all together, by drawing off several cans by the cock, and emptying them into the cask by the bung holes. Now rummage all well together, till they are perfectly compounded.

Spirits or compounds that are strong, require no assistance in setting, and becoming clear; but those that are weak must be refined by the addition of some other substance. To every hogshead of Geneva, or other spirituous compound, put six ounces of powdered alum, previously dissolved in three or four gallons of the compound: stir all well together. In the course of twenty-four hours, the whole will be rendered completely clear.

It is a good practice to leave the bung-holes of casks (containing spirits or compounds newly made) open for several days: this improves their flavour, and renders them clear, sooner than they would otherwise be.

Table-salt, thrown into the still, in the proportion of 6 ounces to 10 gallons of any liquid to be distilled, will greatly improve the flavour, taste, and strength of the spirit. The viscid matter will be fixed by the salt, whilst the volatile matter ascends in a state of great purity.

The flavour of malt spirits is highly improved by putting 3 1-2 ounces of finely powdered charcoal, and 4 1-2 ounces of ground rice, into a quart of spirits, and letting it stand during 15 days, frequently stirring it; then let the liquor be strained, and it will be found nearly of the same flavour as brandy.

To make charcoal.

This is usually manufactured from coppice wood, cut every 16 years; the faggots are made into a large conical pile, covered up with clods of earth, leaving circular rows of holes from top to bottom. The wood is then kindled, and as it becomes red, the holes are regularly closed to stop the further combustion, and when the whole has been closed up, the pile is left to cool; when the black skeleton of the wood is left, which differs from the raw wood in burning without any smoke, and with little or no flame, yielding at the same time no soot, although some of the finer particles of the ashes are volatilized and adhere to the chimney. The air which passes through the burning charcoal has its oxygenous part converted into carbonic acid gas, without being, when cooled, any ways altered in bulk, although its weight by the gallon is increased.

The air being thus rendered unfit for respiration, kills whatever animals or plants are confined in it: numerous accidents have happened of persons being suffocated, by sleeping in close rooms with a charcoal fire.

The charcoal for medical purposes should, like that for gun-powder, be made of soft woods, as alder, heated in iron long necks until no volatile matter is given out. Small quantities may be made by burying wood under sand in a covered crucible, and exposing the whole to fire.

To make spirit of wine.

Spirit of wine, as it is called, was formerly, and is still, in southern countries, obtained by distilling wine for its yield of brandy, and then slowly abstracting the more volatile part of the brandy, by a small fire and the use of tall vessels. In England, spirit of wine is, in general, obtained from ground meal, either of wheat, rye, or barley, with from one-tenth to one-third of the same, or another grain, malted and ground, and then called malt spirit; or from treacle, and then called molasses spirit; some is also made from apples, or cider wash. The fermentation is carried on quicker and farther than in brewing or making cider, in order that all the sugar in the wash, may be converted into spirit and water. The infusion of the malt and meal is made so strong, that its specific gravity is from 1.083 to 1.14, (whereas that for strong ale, is generally 1.06 and for small beer, 1.015 to 1.04) and is mixed with a large quantity of yeast, added by successive portions, until in about ten days, the specific gravity is reduced to 1.002, when it is fit for the still. In general, a third part is drawn off at the first stilling, under the name of low wines, the specific gravity being about 0.975. On re-distilling the low wines, a fiery spirit, of a milky cast, comes over first, and is returned into the still; then follows the clean spirit; when it begins to grow too watery, the remaining spirit that comes over, as long as it will take fire, is kept apart, under the name of feints, and mixed with the next parcel of low wines. Instead of these trials, the head of the still may have the bulb of a thermometer inserted into it, and by observing the temperature of the steam, an accurate judgment may be formed of the strength of the spirit that distils over. It is computed, that 100 gallons of malt, or corn wash, will produce about 20 of spirit, containing about half its weight of water; molasses wash, 22 gallons; cider wash, 15 gallons. The best French wines yield from 20 to 25 gallons. The spirit thus obtained is for chemical and pharmaceutical purposes mixed with water, to separate the oil it contains, and re-distilled several times in tall vessels, with a very gentle heat, until its specific gravity is reduced to 0.82; though that usually sold is only 0.837, at 60 deg. Fahrenheit. By distilling spirit of wine with purified pearl ashes, salt of tartar, muriate of lime, lime, or common salt, all previously heated to redness, and cooled, its specific gravity may be reduced still lower, even as low as 0.792, at 68 deg. Fahrenheit; but there is reason to think that it not only parts with water, but also undergoes some change, or acquires some impregnation, by these additions, as its taste is altered. This spirit of wine, from which every particle of water is separated, is called by the Arabic name of alcohol.

To make ether.

The old chemists, after mixing spirit of wine with an equal part of oil of vitriol, digested it for a long time time, and then distilled the most volatile part, which was called the sweet oil of vitriol. At present, the mixture, whose temperature is considerably increased, is placed in a heated sand bath and distilled, without being suffered to cool until one half the quantity of the spirit is come over; meanwhile, an inflammable gas also passes over. If the distillation is continued, sulphurous acid passes over, and a light yellow sweet oil of wine; the black residuary sulphuric acid contains charcoal diffused through it, which may be separated by admixture with water and filtration. If fresh alcohol is poured on the residuum, more ether may be obtained by distillation. The unrectified ether, as the first product is called, contains both water and alcohol: dry salt of tartar separates the first, and then pouring off the upper liquid, and adding dry muriate of lime in powder, this salt unites with the alcohol, and the ether swims on the solution.

To imitate foreign spirits.

A great desideratum among distillers, in this country, is to imitate foreign spirits, such as brandy, rum, geneva, &c. to a tolerable degree of perfection; but notwithstanding the many attempts that are daily made for this purpose, the success, in general, has been indifferent. The general method of distilling brandies in France, differs in nothing from that practised here, with malt-wash or molasses; nor are the French distillers in the least more cleanly in their operations. Still though brandy is distilled from wine, experience tells us that there is a great difference in the grapes from which the wine is made. Every soil, every climate, every kind of grape, varies with regard to the quantity and quality of the spirit distilled from them. A large quantity of brandy is distilled in France during the time of the vintage: for the poor grapes that prove unfit for wine, are usually first gathered, pressed, their juice fermented, and instantly distilled. It is a general rule with them, not to distil wine that will fetch any price *as wine;* for, in this state, the profits obtained are much greater than when the wine is reduced to brandies.

For a long time, this liquor was distilled only from spoilt wine, and afterwards from the dregs of beer and wine; and when, instead of these, the distillers employed rye, wheat, and barley, it was considered as a wicked and unpardonable misuse of corn.

To condense vapours in distillation.

This is best accomplished by means of a

disk attached to the tube of the still which has the figure of a lens, flattened as much as possible and made of copper. It produces a much better and more rapid effect, than the worms employed for that purpose.

To make British brandy.

To sixty gallons of clean rectified spirit put 1 pound of sweet spirit of nitre, 1 pound of cassia buds ground, 1 pound of bitter almond meal, (the cassia and almond meal to be mixed together, before they are put to the spirits,) 2 ounces of sliced orris root, and about 30 or 40 prune stones pounded; agitate the whole well together, two or three times a day, for three days or more: let them settle, then pour in 1 gallon of the best wine vinegar; and add to every 4 gallons 1 gallon of foreign brandy.

To imitate Cogniac brandy.

English spirits, with proper management, are convertible into brandy, hardly distinguishable from foreign, provided the operation is neatly performed. The best and indeed the only method of imitating the French brandies to perfection is by an *essential oil of wine*, this being the very ingredient which gives the French brandies their flavour. It must however be remembered, that in order to use even this ingredient to advantage, a pure *tasteless spirit must first be produced.*

To prepare the oil of wine, dissolve some cakes of dry wine-lees in six or eight times their weight of water, distil the liquor by a slow fire, and separate the oil by a separatory glass, reserving for the nicest uses that which comes over the first, the succeeding oil being coarser and more resinous. This oil of wine should be dissolved in alcohol, otherwise it will soon grow rancid.

To imitate cogniac brandy, it will be necessary to distil the essential oil from cogniac lees, and the same for any other kind of brandy. The proof, it may be easily accomplished, by using a spirit *rectified above proof*, which, intimately combined with the essential oil, may be reduced to a proper standard by distilled water. The softness may, in a great measure, be obtained by distilling and rectifying the spirit over a gentle fire; and, what is wanting, when the spirit is first made, will be supplied by time. Treacle or burnt sugar gives the spirit a fine colour, nearly resembling that of French brandy; but as its colour is deep, a large quantity must be used: and the bubble proof is greatly heightened by the tenacity imparted to the liquor by the treacle, while the spirit acquires from the mixture a luscious taste. A much smaller quantity of burnt sugar than of treacle will however be sufficient for colouring the same quantity of spirits, and it acquires an agreeable bitterness. The burnt sugar is prepared by dissolving a proper quantity of sugar in a little water, and scorching it over the fire till it acquires a black colour.

To procure the oil of wine.

This oil should be distilled from the thick lees of French wines, because of the flavour, and when procured must be kept ready for use. It must be mixed with the purest spirit of wine, such as alcohol: by which means it may be preserved a long time. The bottle should be shaken before the oil is used.

When the flavour of the brandy is well imitated by a proper portion of the essential oil, and the whole reduced into one nature, yet other difficulties still exist; which are, the colour, the softness, and the proof. The proof may be effected by using a spirit above proof, which after being mixed with the oil may be let down to any strength with water. The softness will be obtained by getting a spirit that has been distilled by a slow fire; and the colour may be regulated by the use of brandy colouring.

To make brandy from treacle.

Spirit distilled from common treacle dissolved in water, should be fermented in the same manner as the wash for common malt spirit. If fresh wine-lees abounding in tartar, are well fermented with molasses, the spirit will acquire a greater vinosity and briskness, and approach the nature of foreign brandy. If the molasses spirit, brought to the common proof strength, is found not to have sufficient vinosity, it will be proper to add some sweet spirits of nitre; and if the spirit has been properly distilled by a gentle heat, it may, by this addition only, be made to pass with ordinary judges as French brandy. Great quantities of this spirit are used in adulterating foreign brandy, rum, and arrack. Much of it is also used alone, in making cherry brandy and other cordials by infusion; in all which many prefer it to foreign brandies. Molasses, like all other spirits, is entirely colourless when first extracted; but distillers give it, as nearly as possible, the colour of foreign spirits.

To make brandy from potatoes.

Potatoes by distillation afford brandy of the best quality, not to be distinguished from that obtained from wine. One thousand lbs. pressed, fermented, and distilled daily, affords from 60 to 70 quarts of good brandy. The residue of the potatoe, after the spirit is extracted, is used as food for cattle.

To improve British brandy.

Take thirty gallons of fine English brandy, three ounces of tincture Japanica, and nine ounces of spirit of nitre dulcit. Incorporate these with some of the spirit, and then put it into the rest of the liquor, and stir it well about. This will make thirty gallons of brandy, and if it be a good clean spirit, it will much resemble French brandy.

To prepare tincture Japanica.

Take of the best English saffron, and dissolve one ounce, mace bruised, one ounce; infuse them into a pint of brandy till the whole tincture of the saffron is extracted, which will be in seven or eight days: then strain it through a linen cloth, and to the strained tincture add two ounces of tartar Japanica powdered fine; let it infuse till the tincture is wholly impregnated.

To make Jamaica rum.

This is obtained from the refuse of the raw sugar manufactories, by taking equal quantities of the skimmings of the sugar pans, of lees or returns as they are commonly called, and of water; and to 100 gallons of this wash are added ten gallons of molasses. This affords from 10 to 17 gallons of proof rum, and twice as much low wines; it is sometimes rectified to a strength approaching to spirit of wine, and is then called double distilled rum.

To imitate Jamaica rum.

To imitate Jamaica rum, it is necessary to procure some of the tops, or other parts of the sugar canes, and to put them in a still, in the proportion of a pound weight to two gallons of pure flavourless spirit, and one gallon of pure water. The distillation may be carried on by a brisk heat, provided there is a quantity of common salt, (in the proportion of an ounce to each gallon of liquid in the still,) to prevent the mucilaginous matter from arising with the spirit. The product when rectified and coloured by burnt sugar, will possess every character of excellent rum.

To obtain rum from molasses.

Mix two or three gallons of water with one gallon of molasses, and to every 200 gallons of this mixture add a gallon of yeast. Once or twice a day the head as it rises is stirred in, and in three or four days, 2 gallons more of water is added to each gallon of molasses originally used, and the same quantity of yeast as at first. Four, five, or six days after this, a portion of yeast is added as before, and about an ounce of jalap root powdered, (or in winter one ounce and a half,) on which the fermentation proceeds with great violence, and in three or four days, the wash is fit for the still: one hundred gallons of this wash is computed to yield twenty-two gallons of spirit from one to ten over proof.

To prepare gin as in Holland.

The grist is composed of ten quarters of malt, ground considerably finer than malt distillers' barley grist, and three quarters of rye-meal; or, more frequently, of ten quarters of rye and three quarters of malt-meal. The ten quarters are first mashed, with the least quantity of cold water it is possible to blend it with, and when uniformly incorporated, as much boiling water is added as forms it into a thin batter: it is then put into one, two, or more casks, or gyle tuns, with a much less quantity of yeast than is usually employed by our distillers. Generally, on the third day, the Dutch distillers add the malt or rye-meal, prepared in a similar manner, but not before it comes to the temperature of the fermenting wash; at the same time adding as much yeast as at first.

The principal secret is the management of the mashing part of the business, in first thoroughly mixing the malt with the cold water, and in subsequently adding the due proportion of boiling water, that it may still remain sufficiently diluted after the addition of the fine meal; also in well rousing all together in the back, that the wash may be dilute enough for distilling, without endangering its burning to the bottom.

Rectification into Hollands gin.

To every 20 gallons of spirit of the second extraction about the strength of proof, take of juniper-berries, 3 lbs.—oil of juniper, 2 oz.—and distil with a slow fire, until the feints begin to rise, then change the receiving can; this produces the best Rotterdam gin.

An inferior kind is made with a still less proportion of berries, sweet fennel seed, and Strasburg turpentine, without a drop of oil of juniper; and a better sort, but inferior to the Rotterdam, is made at Weesoppe. The distiller's wash at Scheedam and Rotterdam, is lighter than at Weesoppe. Strasburg turpentine is of a yellowish-brown colour, a very fragrant agreeable smell, yet the least acrid of the turpentine. The juniper-berries are so cheap in Holland, that they must have other reasons than mere cheapness for being so much more sparing of their consumption than our distillers.

To make malt spirit.

Mix 60 quarters of barley grist, ground low, and 20 quarters of coarse ground pale malt, with 250 barrels of water, at about 170 degrees Fahrenheit. Take out 30 barrels of the wort, and add to this 10 store of fresh porter yeast, and when the remaining wort is cooled down to 55 degrees, add 10 quarters more malt, previously mixed with 30 barrels of warm water; stir the whole well together, and put it to ferment along with the reserved yeasted wort: this wash will be found to weigh, by the saccharometer, from 28 to 32 lbs. per barrel, more than water. In the course of 12 or 14 days, the yeast head will fall quite flat, and the wash will have a vinous smell and taste, and not weigh more than from 2 to 4 lbs. per barrel more than water. Some now put 20 lbs. of common salt, and 30 lbs. of flour, and in 3 or 4 days put it into the still, previously stirring it well together. Every 6 gallons of this wash will produce one gallon of spirit, at from 1 to 10 over proof; or 18 gallons of spirit from each quarter of grain.

English geneva.

The best English geneva is made as follows: Take of juniper-berries, 3 lbs.—proof spirit, 10 gallons, water, 4 do. Draw off by a gentle fire, till the feints begin to rise, and make up the goods to the required strength with clear water.

To distil spirits from carrots.

Take one ton and eight stone of carrots, which, after being exposed a few days to dry, will weigh about 160 stone. The whole being cut, put one-third of the quantity into a copper, with twenty-four gallons of water, and after covering them up close, reduce the whole into a pulp. The other two-thirds are to be treated in the same manner, and as the pulp is taken from the copper, it is carried to the press, where the juice is extracted with great facility. The liquor obtained will amount to 200 gallons, and will be of a rich sweet taste, resembling wort. It is then put into the copper with one pound of hops, and suffered to boil about five hours, when it is put into the cooler, to remain till the heat comes down to

66 degrees. From the cooler it is discharged into the vat, where six quarts of yeast are put to it, in the usual manner. Let it work forty-eight hours, or till 58 degrees, when the yeast begins to fall. Then heat twelve gallons of unfermented juice, and put it to the liquor, and the heat will be raised to 66 deg. Work afresh for twenty-four hours longer, the liquor gradually lowering, as before, from 66 to 58 degrees. Tun the whole into half-hogsheads, to work from the bung. After standing three days in the casks, fifty gallons may be drawn off, which is rectified the next day without any additional substance. Twelve gallons of spirit will be obtained.

To make arrack.

Arrack is no other than a spirit produced by distillation from a vegetable juice called toddy, which flows out of the cocoa-nut tree. The operator provides himself with a parcel of earthen pots, climbs up the trunk of a cocoa-tree; and when he comes to the boughs, he cuts off one of the small knots or buttons, and applies the mouth of a bottle to the wound, fastening it to the bough with the bandage: in the same manner he cuts off others, and proceeds till the whole number is employed: this done, he leaves them until the next morning, when he takes off the bottles, which are mostly filled, and empties the juice into the proper receptacle. When a sufficient quantity is produced, the whole, put together, is left to ferment. When the fermentation is over, and the liquor is a little tart, it is put into the still, and fire being made, the still is suffered to work as long as that which comes off has any considerable taste of spirit. The liquor thus procured is the low wine of arrack; and is distilled again to separate some of its watery parts, and rectify it to that very weak kind of proof-spirit in which state we find it.

Tungusian arrack is a spirituous liquor made by the Tartars of Tungusia, of mare's milk, left to sour, and afterwards distilled twice or thrice between two earthen pots closely stopped, whence the liquor runs through a small wooden pipe.

To fine spirits.

Mix a small quantity of wheat flour in water as if for making paste, and pour the same into the vessel. The whole is then to be well roused, and in a short time the contents will become bright.

To extract alcohol from potatoes.

Take 100 pounds of potatoes well washed, dress them by steam, and let them be bruised to powder with a roller, &c. In the mean time take 4 pounds of ground malt, steep it in lukewarm water, and then pour into the fermenting back, and pour on it twelve quarts of boiling water; this water is stirred about, and the bruised potatoes thrown in, and well stirred about with wooden rakes, till every part of the potatoes is well saturated with the liquor.

Immediately, six or eight ounces of yeast is to be mixed with twenty-eight gallons of water of a proper warmth to make the whole mass of the temperature of from 59 to 66 degrees; there is to be added half a pint to a pint of good brandy.

The fermenting back must be placed in a room, to be kept by means of a stove at a temperature from 66 to 72 degrees. The mixture must be left to remain at rest.

The back must be large enough to suffer the mass to rise seven or eight inches without running over. If, notwithstanding this precaution, it does so, a little must be taken out, and returned when it falls a little; the back is then covered again, and the fermentation is suffered to finish without touching it—which takes place generally in five or six days. This is known by its being perceived that the liquor is quite clear, and the potatoes fallen to the bottom of the back. The fluid is decanted, and the potatoes pressed dry.

The distillation is by vapour, with a wooden or copper still on the plan of Count Rumford. The product of the first distillation is low wines.

When the fermentation has been favourable, from every 100 pounds of potatoes, six quarts and upwards of good brandy, of twenty degrees of the areometer, are obtained; which, put into new casks, and afterwards browned with burnt sugar, like the French brandies, is not to be distinguished from them.

One thousand pounds of potatoes at twice, gives sixty or seventy quarts of good brandy. The residue of the distillation is used as food for stock.

To extract potash from potatoe tops.

It is necessary to cut off the potatoe tops the moment the flowers begin to fall, as that is the period of their greatest vigour; they must be cut off at four or five inches from the ground, with a very sharp knife. Fresh sprouts spring, which will not only answer all the purposes of conducting the roots to maturity but tend to an increase of their volume, as they, (the sprouts) demand less nourishment than the old top. The tops may be suffered to remain on the ground where cut; in eight or ten days they are sufficiently dry without turning, and may be carted, either home or to a corner of the field, where a hole is to be dug in the earth, about five feet square and two feet deep, (the combustion would be too rapid, and the ashes cool too quick, and thereby diminish the quantity of alkali, were they burnt in the open air.) The ashes must be kept red-hot as long as possible: when the fire is strong, tops that are only imperfectly dried may be thrown in, and even green ones will then burn well enough.

The ashes extracted from the hole must be put in a vessel, and boiling water be poured upon it, as then the water must be evaporated: for these two operations potatoe tops may be used alone as firing in the furnace, and the ashes collected. There remains after the evaporation, a dry saline reddish substance, known in commerce under the name of *salin;* the more the ashes are boiled, the greyer and more valuable the *salin* becomes.

The *salin* must then be calcined in a very hot oven, until the whole mass presents an uniform reddish brown. In cooling it remains dry, and in fragments—blueish within, and white on the surface; in which state it takes the name of potass.

The ashes, exhausted of their alkaline principle, afford excellent manure for land intended to be planted with potatoes.

To make brandy from beet root.

For the preparation of brandy, the water used in the first boiling of the roots, is boiled again, and poured out on the residuum from the first expression of the pounded roots; this must stand for a day or two, after which it is expressed, and the remaining dry pulp serves as a good food for cattle. The juice obtained in this way is mixed with the waste parts of the syrup and the mucilage which remains after the expression of the saccharine crystals, and all boiled together till half of it is evaporated. The liquor is then poured into a coop exposed to a temperature of 45 deg. Fahrenheit, and cooled to 65 deg. Having added a proportionate quantity of yeast, it is left to ferment, and in three or four days after the distillation may be undertaken.

To obtain sugar from beet root.

The beet roots best calculated for the extraction of sugar, are those which have a soft flesh, whitish towards the edges and not growing above ground. After being cleaned, they are boiled, cut into pieces and pounded in a wooden trough with wooden stampers, and afterwards pressed. The juice thus obtained is immediately put into a polished copper kettle and simmered, during which time the scum must continually be taken off. To one hundred quarts of this juice add two ounces or less of slackened lime, diluted so as to have the appearance of milk, and continue the boiling till the juice is thickened to the half of it. Having strained it through a woollen cloth, thicken it to the consistency of a syrup, which afterwards is put into glass, stone, or wooden vessels. These being placed near a moderate fire, saccharine crystals appear, which being freed by expression from the mucilaginous juice, a very good raw sugar is obtained.

To make proof spirit.

The London College mentions no proportions, but requires the specific gravity of .930; the Dublin advises the mixture of four measures of spirit with three of water, and the Edinburgh College orders equal measures of their alcohol and water, the specific gravity of which mixture they quote as .935. The chemists in London are in the habit of making their proof spirit, by taking half spirit of wine and half water, whenever it is required, as they seldom or never keep it in that state.

To make tincture of salt of tartar.

Melt 6 oz. of salt of tartar in a crucible; powder it while hot, and immediately pour upon the powder a quart of spirit of wine, and digest it for several days.

Tincture of Antimony.

Take of crude antimony, 1 oz.—salt of tartar, and saltpetre, each, 2 oz. Mix and throw them into a red hot crucible; when melted, pour them out into an iron mortar, powder the mass; while hot, and before it grows cold put it into a bottle with a sufficient quantity of spirit of wine.

This and the preceding are to be considered as alcohol made without distillation, but they receive an alkaline taint, which renders them impure.

All these spirits are stimulants, but more employed as luxuries then medicines.

LIQUEURS.

To make ratafia d'angelique.

Take of angelica seeds, 1 drachm,—stalks of angelica, bitter almonds, blanched, each 4 oz.—proof spirit, 12 pints,—white sugar, 2 lbs. Digest, strain, and filter.

Anisette de Bordeaux.

Take of sugar, 9 oz.—oil of aniseed, 6 drops: Rub them together, and add by degrees, spirit of wine, 2 pints,—water, 4 pints. Filter.

To make real creme des barbades.

Take 2 dozen middling sized lemons,—6 large citrons,—loaf sugar, 28 lbs,—fresh balm leaves, 1-2 lb.—spirit of wine, 2 1-2 gallons,—water, 3 1-2 ditto. This will produce about 7 gallons, full measure. Cut the lemons and citrons in thin slices, and put them into a cask; pour upon them the spirit of wine, bung down close, and let it stand ten days or a fortnight; then break the sugar, and boil it for half an hour, in the three gallons and a half of water, skimming it frequently; then chop the balm-leaves, put them into a large pan, and pour upon them the boiling liquor, and let it stand till quite cold; then strain it through a lawn sleeve, and put it to the spirits, &c. in the cask; bung down close, and in a fortnight draw it off; strain it through a jelly bag, and let it remain to fine; then bottle it.

Eau de barbades.

Take of fresh orange-peel, 1 oz.—fresh lemon-peel, 4 oz.—cloves, 1-2 drachm,—coriander, 1 do.—proof spirit, 4 pints. Distil in a bath heat and add white sugar in powder.

To make ratafia de cafe.

Take of roasted coffee, ground, 1 lb.—proof spirit, 1 gallon,—sugar, 20 oz. Digest for a week.

Rattafia de cassia.

Take of ripe black currants, 6 lbs.—cloves, 1-2 drachm,—cinnamon, 1 ditto,—proof spirit, 18 pints,—sugar, 3 1-2 lbs. Digest for a fortnight.

Ratafia des cerises.

Take of morrello cherries, with their kernels bruised, 8 lbs.—proof spirit, 8 pints. Digest for a month, strain with expression, and then add 1 1-2 lbs. of sugar.

Ratafia de chocolat.

Take of Caracca cocoa nuts, roasted 1 lb.—West-India, ditto, ditto, 1-2 lb.—proof spirit, 1 gallon. Digest for a fortnight, strain, and then add sugar, 1 1-2 lbs.—tincture of vanilla, 30 drops.

Eau divine.

Take of spirit of wine, 1 gallon,—essence of lemons, and essence of bergamot, each 1 drachm: Distil in a bath heat: add sugar 4 lbs. dissolved in 2 gallons of pure water: and, lastly, orange flower water, 5 oz.

Elephant's milk.

Take of benjamin, 2 oz.—spirit of wine, 1 pint,—boiling water, 2 1-2 pints. When cold, strain; and add sugar, 1 1-2 lbs.

Ratafia de grenoble.

Take of small wild black cherries, with their kernels, bruised, 12 lbs.—proof spirit, 6 gallons. Digest for a month, strain, and then add 12 lbs. of sugar. A little citron peel may also be added at pleasure.

Marasquin de groseilles.

Take of gooseberries, quite ripe, 102 lbs. black cherry leaves, 12 lbs. Bruise and ferment; distil and rectify the spirit. To each pint of this spirit add as much distilled water, and sugar, 1 lb.

Huile de Venus.

Take of flowers of the wild carrot, picked, 6 oz.—spirit of wine, 10 pints. Distil in a bath heat. To the spirit add as much syrup of capillaire; it may be coloured with cochineal.

Liquedilla.

Take the thin peel of six oranges and 6 lemons, steep them in a gallon of brandy or rum, close stopped, for two or three days; then take 6 quarts of water, and 3 lbs. of loaf sugar clarified with the whites of three eggs. Let it boil a quarter of an hour, then strain it through a fine sieve, and let it stand till cold; strain the brandy from the peels, and add the juice of 5 oranges and 7 lemons to each gallon. Keep it close stopped up six weeks, then bottle it.

French marasquin, a new liqueur.

Advantage has not hitherto been taken of the fruit of the St. Lucian tree, (*prunus mahaleb*, Lin.) This small black fruit is of a very disagreeable taste, but it may produce an excellent liqueur. *M. Cadet de Vaux*, recognizing in this little cherry an aromatic savour, thought it would serve to make a kind of kirsch-wasser. In effect, it ferments and furnishes by distillation a Prussic alcohol; but by putting it first to infuse in brandy for some time, there is obtained, by distillation in a bath heat, a spirit of a very agreeable aromatic, and which, properly sweetened, forms a liqueur comparable to the best marasquin of Italy. It is necessary to bruise the fruit and the nuts before infusing them in brandy. The spirit must also be brought back to 21 degrees before sweetening it. Then add nearly 12 oz. of sugar to every quart of liqueur.—*Journal de Pharmacie*, 1821.

Ratafia de brou de noix.

Take of young walnuts whose shells are not yet hardened, in number, 60,—brandy, 4 pints, —sugar, 12 oz.—mace, cinnamon, and cloves, each 15 gr. Digest for 2 or 3 months, press out the liquor, filter, and keep it for 2 or 3 years.

Ratafia de noyeau.

Take of peach or appricot kernels, with their shells bruised, in number, 120, proof spirit, 4 pints, sugar, 10 oz. Some reduce the spirit of wine to proof with the juice of apricots or peaches, to make this liqueur.

To make creme de noyeau de Martinique.

Take 20 lbs. of loaf sugar,—3 gallons of spirit of wine,—3 pints of orange flower water,—1 1-4 lb. of bitter almonds—2 drachms of essence of lemon, and 4 1-2 gallons of water. The produce will exceed 8 gallons.

Put 2 lbs. of the loaf sugar into a jug or can, pour upon it the essence of lemon, and 1 quart of the spirit of wine; stir it till the sugar is dissolved, and the essence completely incorporated. Bruise the almonds, and put them into a 4 gallon stone bottle or cask, add the remainder of the spirit of wine, and the mixture from the jug or can: let it stand a week or ten days, shaking it frequently. Then add the remainder of the sugar, and boil it in the 4 1-2 gallons of water, for three quarters of an hour, taking off the scum as it rises. When cold, put it in a cask; add the spirit, almonds, &c. from the stone bottle; and lastly, the orange flower water. Bung it down close, and let it stand three weeks or a month; then strain it through a jelly bag, and when fine bottle it off. When the pink is wanted, add cochineal, in powder, at the rate of half a drachm, or two scruples, to a quart.

Ratafia d' ecorces d'oranges.

Take of fresh peel of Seville oranges, 4 oz. —proof spirit, 1 gallon,—sugar, 1 lb. Digest for 6 hours.

Ratafia de fleurs d'oranges.

Take of fresh flowers of orange-tree, 2 lbs.—proof spirit, 1 gallon,—sugar, 1 1-2 pounds. Digest for 6 hours.

Creme d'orange of superior flavour.

Take 3 dozen middling sized oranges, orange flower water, 2 quarts, loaf sugar, 18 lbs. spirit of wine, 2 gallons, tincture of saffron, 1 1-2 oz. water, 4 1-2 gallons. This will produce 7 1-2 gallons.

Cut the oranges in slices, put them into a cask, add the spirit and orange flower water, let it stand a fortnight, then boil the sugar in the water for half an hour, pour it out, and let it stand till cold, then add it to the mixture in the cask, and put in the tincture of saffron. Let it remain a fortnight longer; then strain, and proceed as directed in the receipt for *creme de Barbades*, and a very fine cordial will be produced.

To make fine brandy shrub.

Take 8 oz. of citric acid,—1 gallon of porter, —3 gallons of raisin wine,—2 quarts of orange flower water,—7 gallons of good brandy,—5 do. of water. This will produce 16 gallons. First, dissolve the citric acid in the water, then add to it the brandy; next, mix the raisin wine, porter, and orange flower water together; and lastly, mix the whole: and in a week or ten days, it will be ready for drinking, and of a very mellow flavour.

To make rum shrub.

Leave out the brandy and porter, and add 1 gallon more raisin wine, 6 lbs. of honey, and 10 gallons of good flavoured rum.

To make currant shrub.

Take white currants, when quite ripe, pick them off the stalks, and bruise them; strain out the juice through a cloth, and to two quarts of the juice put 2 lbs. of loaf sugar; when it is dissolved add to it a gallon of rum, then strain it through a flannel bag that will keep in the jelly, and it will run off clear; then bottle it for use.

To make usquebaugh.

Usquebaugh is a strong compound liquor, chiefly taken by way of dram; it is made in the highest perfection at Drogheda in Ireland. The following are the ingredients, and the proportions in which they are to be used.

Take of best brandy, 1 gallon,—raisins, stoned, 1 lb.—cinnamon, cloves, nutmeg, and cardamons, each 1 oz. crushed in a mortar,—saffron, half an ounce,—rind of 1 Seville orange, and brown sugar candy, 1 lb. Shake these well every day, for at least 14 days, and it will, at the expiration of that time, be ready to be fined for use.

Another method.—Take of nutmegs, cloves, and cinnamon, each 2 ounces; of the seeds of anis, caraway, and coriander, each 4 ounces; liquorice root, sliced, half a pound; bruise the seeds and spices, and put them together with the liquorice, into the still, with 11 gallons of proof spirit, and 2 gallons of water; distil with a pretty brisk fire. As soon as the still begins to work, fasten to the nosel of the worm 2 ounces of English saffron, tied up in a cloth, that the liquor may run through it, and extract all its tincture. When the operation is finished, sweeten with fine sugar.—This liqueur may be much improved by the following additions; Digest 4 pounds of stoned raisins, 3 pounds of dates, and 2 pounds of sliced liquorice root, in 2 gallons of water, for 12 hours. When the liquor is strained off, and has deposited all sediment, decant it gently into the vessel containing the usquebaugh.

Ratafia a la violette.

Take of Florentine orris root, 2 dr.—archel, 1 oz,—spirit of wine, 4 pints. Digest, strain, and add sugar 4 lbs.—Liqueurs are also made by adding Hungary-water, honey-water, eau de Cologne, and several other spirits, to an equal quantity of simple syrup, or common capillaire.

COMPOUND SPIRITS, OR CORDIALS.

General Rules.

The perfection of this grand branch of distillery depends upon the observation of the following general rules, which are easy to be observed and practised:—1. The artist must always be careful to use a well cleansed spirit, or one freed from its own essential oil. For as a compound cordial is nothing more than a spirit impregnated with the essential oil of the ingredients, it is necessary that the spirit should have deposited its own. 2. Let the time of previous digestion be proportioned to the tenacity of the ingredients, or the ponderosity of their oil. 3. Let the strength of the fire be proportioned to the ponderosity of the oil intended to be raised with the spirit. 4. Let a due proportion of the finest parts of the essential oil be united with the spirit; the grosser and less fragrant parts of the oil not giving the spirit so agreeable a flavour, and at the same time rendering it thick and unsightly. This may in a great measure be effected by leaving out the feints, and making up to proof with fine soft water in their stead.

A careful observation of these four rules, will render this extensive part of distillation far more perfect than it is at present. Nor will there be any occasion for the use of burnt alum, white of eggs, isinglass, &c. to fine down the cordial waters, for they will presently be fine, sweet and pleasant.

To make aniseed cordial.

Take of aniseed, bruised, 2 lbs.—proof spirit, 12 1-2 gallons,—water, 1 gallon. Draw off 10 gallons with a moderate fire. This water should never be reduced below proof: because the large quantity of oil with which it is impregnated, will render the goods milky and foul, when brought down below proof. But if there is a necessity for doing this, their transparency may be restored by filtration.

To make Cinnamon Cordial.

Take 2 pennyweights of oil of cassia lignea, dissolved with sugar and spirit of wine; 1 1-2 gallons, at 1 in 6,—Cardamon seeds, husked, 1 ounce,—orange and lemon peel dried, of each, 1 oz. Fine with 1-2 a pint of alum water; sweeten with loaf sugar, not exceeding 2 lbs. and make up 2 gallons measure with the water in which the sugar is dissolved. Colour with burnt sugar.

To make strong cinnamon cordial.

Take 8 pounds of fine cinnamon, bruised,—17 gallons of clear rectified spirit, and 2 gallons of water. Put them into the still, and digest them twenty-four hours with a gentle head; after which, draw off sixteen gallons by a pretty strong heat.

To make caraway cordial.

For 20 gallons. Take 1 1-2 ounces of oil of caraway,—20 drops of cassia-lignea oil,—5 drops of essence of orange-peel,—5 drops of the essence of lemon,—13 gallons of spirits, one in five, and 8 lbs. of loaf sugar. Make it up and fine it down.

Cedrat cordial.

The cedrat is a species of citron, and very highly esteemed in Italy, where it grows naturally. The fruit is difficult to be procured in this country; but, as the essential oil is often imported from Italy, it may be made with it as follows: Take of the finest loaf-sugar, powdered, 1-4 lb. Put it into a glass mortar, with 120 drops of the essence of cedrat; rub them together with a glass pestle, and put them into a glass alembic, with a gallon of fine proof spirit, and a quart of water. Place the alembic, in a bath heat, and draw off one gallon, or till the feints begin to rise; then dulcify with fine sugar. This is considered the finest cordial yet known; it will therefore be necessary to be particularly careful that the spirit is perfectly clean, and, as much as possible, free from any flavour of its own.

Citron cordial.

Take of dry yellow rinds of citrons, 3 lbs.—orange-peel, 2 lbs.,—nutmegs, bruised, 3-4 lb.—proof spirit, 10 1-2 gallons,—water, 1 gallon. Digest with a gentle heat; then draw off 10 gallons in a bath heat, and dulcify with fine sugar.

Clove Cordial.

Take of cloves, bruised, 4 lbs.—pimento, or all-spice, 1-2 lb—proof spirit, 16 gallons. Digest the mixture 12 hours in a gentle heat, and then draw off 15 gallons with a pretty brisk fire. The water may be coloured red, either by a strong tincture of cochineal, alkanet, or corn poppy-flowers. It may be dulcified at pleasure with double refined sugar.

To make coriander cordial.

For 3 gallons. Take 7 quarts of spirits,—2 lbs. of corriander seed,—1 oz. of caraway seed,—6 drops of the oil of orange, with 2 lbs. of sugar.—Fill up with water. The coriander seed must be bruised and steeped in spirits for ten or twelve days, and well stirred two or three times a day. Fine it the same as gin.

Eau de bigarade.

Take the outer or yellow part of the peels of 14 bigarades (a kind of orange,)—1-2 oz. of nutmeg,—1-4 oz. of mace,—1 gallon of fine proof spirit, and 2 quarts of water. Digest all these together two days in a close vessel; after which draw off a gallon with a gentle fire, and dulcify with fine sugar.

Gold cordial.

Take of the roots of angelica, sliced, 4 lbs.—raisins, stoned, 2 lbs.—coriander seed, 1-2 lb.—caraway-seeds and cinamon, each, 1-2 lb.—cloves, 2 oz.—figs and liquorice root, sliced, each, 1 lb.—proof spirit, 11 gallons,—water, 2 gallons. Digest two days; and draw off by a gentle heat, till the feints begin to rise: hanging in a piece of linen, fastened to the mouth of the worm, an ounce of English saffron. Then dissolve eight pounds of sugar in three quarts of rose-water, and add to it the distilled liquor.

The above cordial derives its name from a quantity of leaf gold being formerly added to it; but this is now generally disused.

To make lovage cordial.

For 20 gallons. Take of the fresh roots of lovage, valerian, celery, and sweet fennel, each 4 oz.—essential oil of caraway and savin, each 1 ounce,—spirit of wine, 1 pint,—proof spirit, 12 gallons,—loaf-sugar, 12 lbs. Steep the roots and seeds in the spirits for 14 days; then dissolve the oils in the spirit of wine, and add them to the undulcified cordial drawn off from the other ingredients; dissolve the sugar in the water for making up, and fine, if necessary, with alum.

Lemon cordial.

Take of dried lemon-peel, 4 lbs.—proof spirit, 10 1-2 gallons,—water, 1 gallon. Draw off ten gallons by a gentle fire, and dulcify with fine sugar.

To make nectar.

For 20 gallons. Take 15 gallons of red ratafia,—1-4 oz. of cassia-oil, and an equal quantity of the oil of caraway seeds. Dissolve in half a pint of spirit of wine, and make up with orange wine, so as to fill up the cask. Sweeten, if wanted, by adding a small lump of sugar in the glass.

To make noyeau.

Take 1 1-2 gallons of French brandy, 1 in 5,—6 oz. of the best French prunes,—2 oz. of celery,—3 oz. of the kernels of apricots, nectarines, and peaches, and 1 oz. of bitter almonds, all gently bruised,—essence of orange-peel, and essence of lemon-peel, of each 2 pennyweights,—1-2 a pound of loaf-sugar. Let the whole stand ten days or a fortnight; then draw off, and add to the clear noyeau as much rose water as will make it up to two gallons.

Orange cordial.

Take of the yellow part of fresh orange-peel, 5 lbs.—proof spirit, 10 1-2 gallons,—water, 2 gallons. Draw off ten gallons with a gentle fire.

To make peppermint cordial.

For twenty gallons. Take 13 gallons of rectified spirits, one in five under hydrometer proof,—12 lbs. of loaf sugar,—1 pint of spirit of wine, that will fire gunpowder,—15 pennyweights troy, of oil of peppermint,—water, as much as will fill up the cask, which should be set up on end, after the whole has been well-roused, and a cock for drawing off placed in it.

Ratafia.

This is a liquor prepared from different kinds of fruits, and is of different colours according to the fruits made use of. These fruits should be gathered when in their greatest perfection, and the largest and most beautiful of them chosen for the purpose. The following is the method of making *red ratafia*, fine and soft:—Take of the black-heart cherries, 24 lbs.—black cherries, 4 lbs.—raspberries, and strawberries, each, 3 lbs. Pick the fruit from their stalks, and bruise them, in which state let them continue 12 hours; then press out the juice; and to every pint of it, add 1-4 lb. of sugar. When the sugar is dissolved, run the whole through the filtering bag and add to it three quarts of proof spirit. Then take of cinnamon, 4 oz. mace, 1 oz. and cloves, 2 drachms. Bruise these spices, put them into an alembic with a gallon of proof spirit and two quarts of water, and draw off a gallon with a brisk fire. Add as much of this spicy spirit to the ratafia, as will render it agreeable, about one-fourth is the usual proportion.

Dry or sharp ratafia.

Take of cherries and gooseberries, each 30 lbs.—mulberries, 7 lbs.—raspberries, 10 lbs. Pick all these fruits clean from their stalks, &c. bruise them, and let them stand twelve hours; but do not suffer them to ferment. Press out the juice, and to every pint add three ounces of sugar. When the sugar is dissolved, run it through the filtering bag, and to every five pints of liquor add four pints of proof spirit; together with the same proportion of spirit drawn from spices.

Common ratafia.

Take of nutmegs, 8 oz.—bitter almonds, 10 lbs.—Lisbon sugar, 8 lbs.—ambergris, 10 grains. Infuse these ingredients three days in 10 gallons of proof spirit, and filter it through a flannel bag for use. The nutmegs and bitter almonds must be bruised, and the ambergris rubbed with the Lisbon sugar in a marble mortar, before they are infused in the spirit.

Cherry brandy.

One of the best and most common ways of making cherry brandy, is to put the cherries (being first clean picked from the stalks) into a vessel, till it be about half full; then fill up with rectified molasses brandy, which is generally used for this compound, and when they have been infused sixteen or eighteen days, draw off the liquor by degrees, as wanted: when drawn off, fill the vessel a second time nearly to the top, let it stand about a month, and then draw it off as there is occasion. The same cherries may be used a third time by covering them with over-proof brandy, and letting it infuse for six or seven weeks; when drawn off for use, as much water must be added as the brandy was over-proof, and the cherries must be afterwards pressed as long as any liquor remains in them, before being cast away.

When drawn off the second time, the liquor will be somewhat inferior to the first, when more sugar, with half an ounce of cinnamon and cloves beaten, may be added to twenty gallons of it; but there should only be half the quantity of cinnamon and cloves in each twenty gallons of the first infusion.

Another method.—Take 72 pounds of cherries, half red and half black—mash or squeeze them to pieces with the hands, and add to them three gallons of brandy, letting them steep for 24 hours—then put the mashed cherries and liquor into a canvas bag a little at a time, and press it as long as it will run. Sweeten it with loaf sugar, and let it stand a month—then bottle it off, putting a lump of loaf sugar into every bottle.

Another.—To every four quarts of brandy, put four pounds of red cherries, two pounds of black, one quart of raspberries, with a few cloves, a stick of cinnamon, and a little orange peel; let these stand a month close stopped; then bottle it off, putting a lump of loaf sugar into every bottle.

Black cherry brandy.

Stone eight pounds of black cherries, and put on them a gallon of brandy. Bruise the stones in a mortar, and then add them to the brandy. Cover them close, and let them stand a month or six weeks. Then pour it clear from the sediment, and bottle it. Morello cherries, managed in this manner, make a fine rich cordial.

Caraway brandy.

Steep an ounce of caraway seeds, and six ounces of loaf sugar, in a quart of brandy; let it stand nine days, and then draw it off.

Lemon brandy.

Put five quarts of water to one gallon of brandy; take two dozen of lemons, two pounds of the best sugar, and three pints of milk. Pare the lemons very thin, and lay the peel to steep in the brandy twelve hours. Squeeze the lemons upon the sugar, then put the water to it, and mix all the ingredients together. Boil the milk, and pour it in boiling. Let it stand 24 hours and then strain it.

Orange Brandy.

Put the chips of eighteen Seville oranges in three quarts of brandy, and let them steep a fortnight in a stone-bottle close stopped. Boil two quarts of spring-water, with a pound and a half of the finest sugar, nearly an hour very gently. Clarify the water and sugar with the white of an egg, then strain it through a jelly-bag, and boil it nearly half away. When it is cold, strain the brandy into the syrup.

Raspberry brandy.

Take a pint of water and two quarts of brandy, and put them into a pitcher large enough to hold them and four pints of raspberries. Put in half a pound of loaf sugar, and let it remain for a week close covered. Then take a piece of flannel, with a piece of holland over it, and let it run through by degrees. It may be racked into other bottles a week after, and then it will be perfectly fine.

Another method.—Raspberry brandy is infused nearly after the same manner as cherry brandy, and drawn off with about the same addition of brandy to what is drawn off from the first, second, and third infusion, and dulcified accordingly, first making it of a bright deep colour; omitting cinnamon and cloves in the first, but not in the second and third infusion. The second infusion will be somewhat paler than the first, and must be heightened in colour, by adding cherry brandy about a quart, with ten or more gallons of raspberry brandy; and the third infusion will require more cherry brandy to colour it. It may be flavoured with the juice of the elder berry.

Whiskey cordial.

Take of cinnamon, ginger, and coriander seed, each 3 oz.—mace, cloves, and cubels, each 1 1-2 oz.—Add 11 gallons of proof spirit, and 2 gallons of water, and distil; now tie up 5 oz. of English saffron,—raisins (stoned) 4 1-2 lbs.—dates, 3 do.—liquorice root, 2 do. Let these stand 12 hours in 2 gallons of water, strain, and add it to the above:—Dulcify the whole with fine sugar.

ESSENTIAL AND OTHER OILS.

The oils are obtained by distillation, with a sufficient quantity of water to prevent the articles from adhering to the still, and the oil and water acquiring a burnt taste; they are all stimulant, in doses of from 2 to 10 drops upon sugar.

Oil of aniseed.

One pound of the seeds will yield 2 drachms. It is congealed, except in warm weather; this oil is carminative, and poisonous to pigeons, if rubbed on their bills or head.

Cajeput oil.

This is obtained from the leaves, which are imported from the East Indies, generally in large copper flasks; it is cooler than that of peppermint, but smells of turpentine. It is used externally in rheumatism.

Oil of caraway.

This is obtained from the seeds; it is carminative: 2 pounds will yield more than 1 ounce, and 1 cwt. 83 ounces.

Oil of cloves.

This is obtained from the spice of that name; it is very heavy, acrimonious, and supposed to contain some part of the resin of the clove. One pound of cloves will yield from 1 1-2 to 2 1-2 troy oz.; 7 1-2 pounds will yield 1 pound of oil. It is also expressed from the cloves when ripe. Muller, by digesting half an oz. of cloves in ether, and then mixing it with water, obtained 7 scruples of oil, greenish yellow, swimming upon water. Oil of cloves is imported from the spice islands; it is stimulant, and added to purgative pills to prevent griping; it is externally applied to aching teeth.

Oil of cassia.

This is the common oil of cinnamon, and is obtained from the bark of inferior cinnamon, imported under the name of cassia. One pound will yield from 1 to 1 1-2 drachms. It is stimulant and stomachic. Another oil is obtained from cassia buds.

Oil of chamomile.

This is obtained from the flowers, and is stomachic. One pound will yield a drachm; 82 pounds will yield from 13 to 18 drachms. It is of a fine blue, even if distilled in glass vessels.

Oil of cinnamon.

This is obtained from the fresh bark which is imported from Ceylon. De Guignes says, the cinnamon of Cochin China is so full of essential oil, that it may be pressed out by the fingers.

Essence of cedrat.

This is obtained from the flowers of the citron tree; it is amber-coloured and slightly fragrant; 60 pounds will yield 1 ounce. It is also obtained from the yellow part of citron peel; it is colourless, very thin, and fragrant. The second oil is obtained by the distillation of the yellow part of citron peel, and is greenish; 100 citrons will yield 1 ounce of the white essence, and half an ounce of this. It is likewise obtained from the yellow part of citron peel by expression between two glass plates. Also, from the cake left on squeezing citron peel, by distillation with water; it is thick.

Common essence of cedrat.

This is obtained from the fæces left in the casks of citron juice; clear, fragrant, greenish; 50 pounds of fæces will yield, by distillation, 3 pounds of essence.

Foreign oil of lavender.

This is the true oil of spike, and is obtained from the flowers and seeds of broad-leaved lavender, and more commonly those of French lavender, stœchas, with a quick fire. It is sweet scented, but the oil of the narrow-leaved lavender, or English oil, is by far the finest.

Essence of lavender.

The oil of the flowers of lavender is rendered more delicate in its odour by age; but to prevent its becoming glutinous by keeping, which it is very apt to do, draw it over in a water bath, with a small quantity of alcohol, which is termed the essence, and which, after being kept closely corked for about seven years, possesses a peculiarly fine delicate odour of lavender, entirely free from empyreuma.

Oil of mint.

Obtained from the dried plant; 6 pounds of fresh leaves will yield 3 1-2 drachms; and 4 lbs. dried will yield 1 1-2 ounce. It is stimulant, carminative, and antispasmodic.

Essence of neroli.

Obtained from the flowers of the orange tree; 5 cwt. of flowers will yield only 1 ounce of oil. Another essence is obtained from orange peel, and is very fragrant. A third essence is obtained from unripe oranges, and is of a gold colour.

Oil of nutmegs.

Obtained from that spice; it is liquid, and of a pale yellow; a sebaceous insipid matter swims upon the water in the still.

Oil of peppermint.

Obtained from the dried plant; 4 lbs. of the fresh herb will yield 4 drachms. In general it requires rectification to render it bright and fine. It is stimulant and carminative.

Oil of pennyroyal.

Obtained from the herb when in flower; 3 pounds will yield 6 drachms: emmenagogue.

Oil of pimento.

Obtained from allspice: one ounce will yield 30 drops. It is stimulant.

Oil of rhodium.

Obtained from the true *lignum rhodium*: 80 pounds will yield 9 drachms, and in very resinous old wood, 80 pounds will yield 2 ounces. It is light yellowish, but grows red by keeping. Another oil is obtained from the root or rose wort, *rhodiola rosea*; it is yellowish, and has the smell and taste of that from the true *lignum rhodium*: 1 pound will yield a drachm.

The true Riga balsam.

Obtained from the shoots of the Aphernousli pine, *pinus cembra*, previously bruised and macerated for a month in water. It is pellucid, very liquid, whitish, and has the smell and taste of oil of juniper.

Butter of roses.

Obtained from the flowers of damask roses, white, solid, separating slowly from the rose water: it has little scent of its own, and is used to dilute the scent of musk, civit, and ambergris: 1 cwt. of roses will yield from 1-2 ounce to an ounce.

Oil of rosemary.

Obtained from the flowering tops; it is sweet-scented: 1 cwt. will yield 8 ounces: 1 pound of dry leaves will yield from 1 to 3 drachms: 70 pounds of fresh leaves will yield 5 ounces.

Oil of rue.

Obtained from the dried plant; it is carminative, and antispasmodic: 10 pounds of leaves will yield from 2 to 4 drachms; four pounds in flower, will yield 1 drachm; and 60 pounds will yield 2 1-2 ounces; 72 pounds, with the seeds, will yield 3 ounces.

Oil of sassafras.

Obtained from the sassafras root; 24 pounds, will yield 7 ounces; 30 pounds will yield 9 ounces and 1 drachm; and 6 pounds, will yield 2 ounces.

Oil of thyme.

Obtained from the plant; 2 cwt. fresh will yield 5 1-2 ounces; 3 1-2 pounds, dried, will yield 1-2 a drachm. It is stimulant, and caustic; and used in tooth-ache, applied to the tooth.

Oil of wormwood.

Obtained from the herb; stomachic: 25 pounds of green wormwood will yield from 6 to 10 drachms of oil; 4 pounds of dry will yield one ounce, and 18 pounds only 1 1-2 troy ounces.

Birch oil.

Obtained by distilling 20 parts of birch bark, and 1 of *ledum palustre*, crammed in layers into an earthen pot, with a handful of tripoly between each layer; the mouth of the pot is closed with a perforated oak plug, and being inverted, it is luted to the mouth of another pot sunk in the ground; the pot being then surrounded with fire, a brown empyreumatic oil distils *per descensum* into the lower jar: an 8 gallon pot, properly filled, yields about 2 lbs. or 2 1-2 lbs. of oil. In Siberia, it is prepared without the ledum. This oil is liquid when fresh, but grows thick in time. It is used in Russia for currying leather, to which it gives a very peculiar smell, much disliked by insects.

Oil of gum-benzoin.

Obtained by distilling the residuum left after making flowers of benjamin, by a strong fire. It is used instead of birch oil, in making an imitation of Russia leather.

Oil of turpentine.

Distilled, in Europe, from common turpentine, with the addition of about 6 times as much water; but in America, where the operation is carried on upon a very large scale, no water is added, and its accidental presence is even dreaded, lest it should produce a disruption of the stilling apparatus.

To rectify oil of turpentine.

Pour three parts of turpentine into a glass retort, capable of containing double the quantity of matter subjected to the experiment. Place this retort on a sand bath; and having adapted to it a receiver five or six times as large, cement with paste made of flower and water, some bands of paper over the place where the two vessels are joined. If the receiver is not tubulated, make a small hole with a pin in the bands of cemented paper, to leave a free communication between the exterior and interior of the receiver; then place over the retort a dome of baked earth, and maintain the fire in such a manner, as to make the essence and the water boil.

The receiver will become filled with abundance of vapours, composed of water and ethereous essence, which will condense the more readily if all the radiating heat of the furnace be intercepted by a plate of copper, or piece of board placed between the furnace and the receiver. When the mass of oil subjected to experiment, has decreased nearly two-thirds, the distillation must be stopped. Then leave the product at rest to facilitate the separation of the ethereous oil, which is afterwards separated from the water on which it floats, by means of a glass funnel, the beak of which is stopped by the finger.

This ethereous oil is often milky, or merely nebulous, by the interposition of some aqueous parts, from which it may be separated by a few days' rest. The essence, thus prepared, possesses a great degree of mobility, and is exceedingly limpid.

Another method.

The apparatus employed in the preceding process may be used in the present case. Fill the retort two-thirds with essence, and as the receiver is tubulated, apply to the tubulure, a small square of paper moistened with saliva, to afford a free passage to the vapours. Graduate the fire in such a manner as to carry on the distillation very slowly, until a little more than half the oil, contained in the retort is obtained. Separate from the product, a very small quantity of exceedingly acid and reddish water, which passes at the same time as the ethereous essence: by these means the operation is much shortened. The oil of turpentine which remains in the retort is highly coloured, and thicker than the primitive essence. It may be used for extending fat, varnish, or for coarse oil painting.

Krumholz oil.

Obtained by distillation from Hungarian balsam. It is distinguished from oil of turpentine, which is commonly sold for it, by its golden colour, agreeable odour, and acid oiliness of taste.

Balsam of turpentine, or Dutch drops.

Obtained by distilling oil of turpentine in a glass retort, till a red balsam is left.

Or, by distilling rosin and separating the oils as they come over; first a white oil, then yellow, lastly a thick red oil, which is the balsam. It is stimulant and diuretic.

Oil of tar.

Obtained by distilling tar, it is highly valued by painters, varnishers, &c. on account of its drying qualities; it soon thickens of itself, almost to a balsam: the acid spirit that comes over with it, is useful for many purposes where an acid is wanted.

Rectified oil of hartshorn, or Dippels' oil.

Obtained from hartshorn, distilled without addition, rectifying the oil, either by a slow distillation, in a retort, &c. no bigger than is necessary, and saving only the first portion that comes over, or with water in a common still; it is very fine and thin, and must be kept in an opaque vessel, or in a drawer, or dark place, as it is quickly discoloured by light. It is antispasmodic, anodyne, and diaphoretic, taken in doses of from 10 to 30 drops, in water.

Japan camphor.

This is obtained from the roots and shoots of the *laurus camphora* and *laurus cinamomum*, as also the *capura curundu*, by distillation with water. This crude camphor is refined by sublimation with one sixteenth of its weight of lime, in a very gentle heat.

Camphor from essential oils.

Obtained from the oils of the labiate plants, by careful distillation, without addition of one third of the oil; the residuum will be found to contain crystals of camphor, on separating which, and re-distilling the remaining oil two or three times, the whole of the camphor may be obtained. Oil of rosemary or of sweet marjoram, yields about 1 oz. of camphor, from 10 of oil; of the sage 1 oz. from 8; and of lavender 1 oz. from 4, or even less of oil: that from oil of marjoram is not volatile, and although it takes fire, it soon goes out. This rosin, like the others from essential oils, may be obtained in a larger proportion, if the oil is kept in slightly stopped bottles in a cool place.

DISTILLED WATERS.

Preservation of flowers for distillation.

Rub three pounds of rose-leaves for two or three minutes with a pound of common salt. The flowers being bruised by the friction of the grains of salt form a paste which is to be put into an earthen jar, or into a water-tight barrel. The same process is to be repeated until the vessel is filled, so that all the roses may be equally salted. The vessel is then to be shut up and kept in a cool place until wanted.

For distillation, this aromatic paste is, at any season, to be put into the body of the still with twice its weight of water; and when heat is applied, the oil, or essential water, is to be obtained in the common way. Both the oil and water, are in this way produced in greater quantity, than by using the leaves without the salt: besides, the preserved paste will keep its flavour and strength unimpaired for several years.

Other flowers, capable of affording essential oils may also be treated in the above-mentioned way, with economy and advantage; as there is thereby no occasion to carry on a hurried process in the heat of summer, when these are in perfection.

General rules for the distillation of simple waters.

1. Plants and their parts ought to be fresh gathered. When they are directed fresh, such only must be employed; but some are allowed to be used dry, as being easily procurable in this state at all times of the year, though rather more elegant waters might be obtained from them whilst green.

2. Having bruised the subjects a little, pour thereon twice its quantity of spring water. This quantity is to be diminished or increased, according as the plants are more or less juicy than ordinary. When fresh and juicy herbs are to be distilled, thrice their weight of water will be fully sufficient, but dry ones require a much larger quantity. In general there should be so much water, that after all intended to be distilled has come over, there may be liquor enough to prevent the matter from burning to the still.

3. Formerly, some vegetables were slightly fermented with the addition of yeast, previous to the distillation.

4. If any drops of oil swim on the surface of the water, they are to be carefully taken off.

5. That the waters may be kept the better, about one-twentieth part of their weight of proof spirit may be added to each, after they are distilled.

Stills for simple waters.

The instruments chiefly used in the distillation of simple waters are of two kinds, commonly called the hot still, or alembic, and the cold still. The waters drawn by the cold still from plants are much more fragrant, and more fully impregnated with their virtues, than those drawn by the hot still or alembic.

The method is this:—A pewter body is suspended in the body of the alembic, and the head of the still fitted to the pewter body: into this body the ingredients to be distilled are put, the alembic filled with water, the still head luted to the pewter body, and the nose luted to the worm of the refrigeratory or worm. The same intention will be answered by putting the ingredients into a glass alembic, and placing it in a bath heat, or balneum mariæ.

The cold still is much the best adapted to draw off the virtues of simples, which are valued for their fine flavour when green, which is subject to be lost in drying; for when we want to extract from plants a spirit so light and volatile, as not to subsist in open air any longer than while the plant continues in its growth, it is certainly the best method to remove the plant from its native soil, into some proper instrument, where as it dies, these volatile parts can be collected and preserved. And such an instrument is what we call the cold still, where the drying of the plant, or flower, is only forwarded by a moderate warmth, and all that rises is collected and preserved.

Expeditious method of distilling simple waters.

Tie a piece of muslin or gauze over a glazed earthen pot, whose mouth is just large enough to receive the bottom of a warming-pan; on this cloth lay the herb, clipped; then place upon them the warming-pan, with live coals in it, to cause heat just enough to prevent burning, by which means, as the steam issuing out of the herb cannot mount upwards, by reason of the bottom of the pan just fitting the brim of the vessel below it, it must necessarily descend, and collect into water at the bottom of the receiver, and that strongly impregnated with the essential oil, and the salt of the vegetable thus distilled: which, if wanted to make spirituous or compound water, is easily done, by simply adding some good spirits or French brandy to it, which will keep good for a long time, and be much better than if the spirits had passed through a still, which must of necessity waste some of their strength. Care should be taken not to let the fire be too strong, lest it scorch the plants; and to be made of charcoal, for continuance and better regulation, which must be managed by lifting up and laying down the lid, as wanted to increase or decrease the degrees of heat. The deeper the earthen pan, the cooler the season; and the less fire at first (afterwards to be gradually raised) in the greater perfection will the distilled water be obtained.

As the more moveable or volatile parts of vegetables are the aqueous, the oily, the gummy, the resinous, and the saline, these are to be expected in the waters of this process: the heat here employed being so great as to burst the vessels of the plants, some of which contain so large a quantity of oil, that it may be seen swimming on the surface of the water.

Although a small quantity only of distilled waters can be obtained at a time by this confined operation, yet it compensates in strength what is deficient in quantity. Such liquors, if well corked up from the air, will keep good a long time, especially if about a twentieth part of any spirits be added, in order to preserve the same more effectually.

To make rosemary water.

As the method of performing the operation by the cold still is the very same, whatever plant or flower is used, the following instance of procuring a water from rosemary will be abundantly sufficient to instruct the young practitioner in the manner of conducting the process in all cases whatever.

Take rosemary, fresh gathered in its perfection, with the morning dew upon it, and lay it lightly and unbruised upon the plate or bottom of the still; cover the plate with its conical head, and apply a glass receiver to the nose of it. Make a small fire of charcoal under the plate, continuing it as long as any liquor comes over into the receiver.

When nothing more comes over, take off the still head, and remove the plant, putting fresh in its stead, and proceed as before; continue to repeat the operation successively, till a sufficient quantity of water is procured. Let the distilled water be kept at rest in clean bottles, close stopped, for some days in a cold place: by this means it will become limpid, and powerfully impregnated with the taste and smell of the plant.

Simple Alexethereal waters.

Take of spearmint leaves, fresh, 1 1-2 lbs. sea wormwood tops, fresh, angelica leaves, fresh, each 1 lb.; water, as much as is sufficient to prevent burning. Draw off by distillation 3 gallons.—Or, take of elder flowers, moderately dried, 2 pounds; angelica leaves, fresh gathered, 1 pound; water, a sufficient quantity. Distil off 3 gallons.

Simple pennyroyal water.

Take of pennyroyal leaves, dry, a pound and a half; water as much as will prevent burning. Draw off, by distillation, 1 gallon.

Simple spearmint water.

Take of spearmint leaves, fresh, any quantity; water, three times as much. Distil as long as the liquor which comes over has a considerable taste or smell of the mint.—Or, take spearmint leaves, dried, 1 1-2 lbs., water as much as is sufficient to prevent burning. Draw off by distillation, 1 gallon.

Cinnamon water.

Take of bruised cinnamon, 1 lb.—water, 2 gallons. Simmer in a still for half an hour, put what comes over into the still again; when cold, strain through flannel.

Eau sans-pareil.

Take 2 gallons of fine old honey-water, put it into a still capable of holding 4 gallons, and add the thinly pared rinds of 6 or 8 fresh citrons, neither *green* nor *mellow* ripe. Then add 60 or 70 drops of fine Roman bergamot: and, having luted the apparatus well, let the whole digest in a moderate heat for 24 hours. Draw off, by a water-bath heat, about 1 gallon.

Jessamine water.

Take 6 pounds of the white sweet almond cakes from which jessamine oil has been made abroad: beat and sift them to a fine powder, and put to it as much fresh oil of jessamine as will be required to make it into a stiff paste. Let this paste be dissolved in about 6 quarts of spring water, which has been previously well boiled, and left until it has become about half cold. Stir and mix the whole well together; and when the oil and water has been well combined, let the whole stand until the powder has fallen to the bottom of the vessel. Now pour the liquid off gently, and filter it through cotton, in a large tin funnel, into the glass bottle in which it is to be kept for use. The powder or sediment which has been left at the bottom of the vessel, when dried by the heat of the sun, answers very well for making almond paste for the hands.

Jamaica pepper water.

Jamaica pepper is the fruit of a tall tree growing in the mountainous parts of Jamaica, where it is much cultivated because of the great profit arising from the cured fruit, sent in large quantities annually into Europe. Take of Jamaica pepper, half a pound; water, two gallons and a half; draw off 1 gallon with a pretty brisk fire. The oil of this fruit is very ponderous, and therefore, this water is made in an alembic.

Myrtle water.

Infuse 8 or 10 lbs. of the cuttings of green myrtle, in nearly 20 gallons of rain or river water, and add thereto a pint of fresh yeast, after it has stood for 24 hours. At the end of another day and night, put the whole into a still, with a pound of bay salt. Draw off the whole of the water: and, next day, infuse more myrtle leaves, as before, and distil again. Repeat the same a third time.

Orange flower water.

Take 2 lbs. of orange flowers, and 24 quarts of water, and draw over three pints.—Or, take 12 lbs. of orange flowers, and 16 quarts of water, and draw over 15 quarts.

Orange peel water.

Take of the outward yellow rind of Seville oranges, 4 ounces; water, 3 gallons and a half; draw off 1 gallon by the alembic, with a brisk fire.

Peppermint water.

Take of the herb of peppermint, dried, 1 1-2 lbs.—water, as much as is sufficient to prevent burning. Distil off a gallon. This has been known to allay sickness when nothing else would succeed, and is used in flatulent colics. A wine-glassful may be taken, and often repeated.

Another.—Take of oil of peppermint, 1 lb.—water, a sufficient quantity. Draw off 30 gallons. This is stimulant and carminative; and covers disagreeable flavours.

Portugal and Angel waters.

Take a pint of orange-flower water, a pint of rose-water, and half a pint of myrtle-water; to these put a quarter of an ounce of distilled spirit of musk, and an ounce of spirit of ambergris. Shake the whole well together, and the process will be finished.

Rose water.

Take of the leaves of fresh damask roses with the heels cut off, 6 lbs.—water, as much as to prevent burning. Distil off a gallon. The distilled waters should be drawn from dried herbs, because the fresh cannot be got at all times in the year. Whenever the fresh are used the weights must be increased; but whether the fresh or dry are made use of, it is left to the judgment of the operator to vary the weight, according as the plants are in greater or less perfection, owing to the season in which they grew, or were collected.

Small snail water.

Take of balm, mint, hart's tongue,—ground ivy, flowers of the dead nettle,—mallow flowers, elder flowers,—each a handful,—snails freed from their shells,—and whites of eggs,—each 4 oz.—nutmegs, 1-2 oz.—milk, 1 gallon. Distil in a water bath to dryness.

Strawberry water.

Take of the bruised fruit, 20 lbs.—water a sufficient quantity. Draw off two gallons and a half: this water is very fragrant.

To estimate the quantity of salts contained in any mineral water.

This may be done with considerable accuracy by finding the difference of weight between a bottle filled to a certain mark with distilled water, and the same filled with the mineral water: to this difference add 1-5th, and again another fifth; the weight will then denote that of the salts contained in the bottle of water; large square case bottles are well adapted for this purpose. Let the difference be 79 grains, 1-5th is 15 grains 4-5ths; and the other 5th the same: total 110 grains 3-5ths.

The salts obtained by the evaporation of a mineral water, are not to be considered as its real contents, because new combinations are formed during the process, and the most insoluble compounds possible are separated first; whereas in the original water there is good reason to suppose the real mode of composition is that of the most soluble compositions that are capable of being formed from the remote principles contained in the water. Hence those common products, sulphate of lime and muriate of soda, probably exist in mineral waters as sulphate of soda and muriate of lime, and it is to the presence of the latter salt that much of the medical effects of mineral waters is to be ascribed.—*Gray's Supplement to the Pharmacopœia.*

Common distilled water.

Take of water, 10 gallons. Distil. Throw away the first 1-2 gallon, and draw off 4 gallons, which keep in glass or stone ware. Distilled water is used as a diet drink in cancerous diseases, and should be used in making medicines when the salts contained in common water would decompose them.

COMPOUND DISTILLED WATERS.

General rules for the distillation of spirituous waters.

1. The plants and their parts ought to be moderately and newly dried, except such as are ordered to be fresh gathered.

2. After the ingredients have been steeped in the spirit for the time prescribed, add as much water as will be sufficient to prevent a burnt flavour, or rather more.

3. The liquor which comes over first in the distillation is by some kept by itself, under the title of spirit; and the other runnings, which prove milky, are fined down by art. But it is preferable to mix all the runnings together, without fining them, that the waters may possess the virtues of the plant entire.

4. In the distillation of these waters, the genuine brandy obtained from wine is directed. Where this is not to be procured, take instead of that proof spirit, half its quantity of a well rectified spirit, prepared from any other fermented liquors. In this steep the ingredients, and then add spring water enough, both to make up the quantity ordered to be drawn off, and to prevent burning.

Bergamot water.

Take of fine old French brandy, 2 gallons, or, 1 gallon of highly rectified spirit of wine, and 1 gallon of spring water. Put to the brandy, or diluted spirits, 1-2 an ounce, or more, of true Roman oil of Bergamot, whose parts have been previously well divided by trituration with lump sugar, in a glass mortar. Now distil by a water heat, and draw off six quarts only. By this operation, a most excellent bergamot water will be produced, which will remain good for twenty years.

Original receipt for Hungary water.

The original receipt for preparing this invaluable lotion, is written in letters of gold in the hand writing of Elizabeth, queen of Hungary: Take of aqua vitæ, four times distilled, 3 parts,—the tops and flowers of rosemary, 2 parts. To be put together in a close-stopped vessel, and allowed to stand in a warm place, during fifty hours, then to be distilled in an alembic, and of this, once every week, 1 drachm to be taken in the morning, either in the food or drink, and every morning the face and the diseased limb to be washed with it.

French Hungary water.

The French Hungary water is made wholly from a wine spirit, and from rosemary flowers alone, which about Montpellier (the place from whence this commodity comes,) grow in great plenty and perfection. The fragrancy of these flowers is so great, as to render the waters made from them more excellent and valuable than any thing of the kind made in England.

Best Hungary water.

Take thirty gallons of spirit of wine: put to it, in a large still, six large bunches of fine green rosemary, when the flowers are white, and in full bloom; one pound of lavender flowers, and four ounces of true English oil of rosemary. The rosemary-leaves and flowers must be stripped from all their wood and green twigs. When the whole has been in a state of digestion for twenty-four hours, distil as before, drawing off about twenty-five or twenty-six gallons, but no more. When distilled, stop it closely in a copper vessel, and keep it undisturbed for about a month.

Aqua mellis, or the king's honey water.
First distillation.

Take 28 pounds of coriander seeds, ground small in the starch-mill,—28 common bunches of sweet marjoram, in flower, dried and stripped from the twigs,—1 pound of *calamus aromaticus*,—1 pound of yellow saunders,—and 1 pound of orange and lemon peel. Let the three last be separately beaten into gross powder. Mix the above ingredients, and put them into a sixty-gallon copper still, and add to them twenty gallons of proof spirit, and the same quantity of rain or spring water. Lute well all the junctures of the apparatus, and leave the ingredients in this state, without fire, for forty-eight hours. At the end of this time, begin to distil by a very gentle heat, lest the flowers and seeds, which are very light, should rise suddenly in the still-head, stop up the worm, and endanger the whole work.

Increase the fire after the first half hour, and keep it regular till the termination of the process. Draw off about twenty-six or twenty-seven gallons, or continue so long as the spirit will burn, by the application of a lighted paper to a small quantity of it in a saucer. Next day, when the still is perfectly cold, let it be well cleaned out. The ingredients should be immediately dried in the sun, otherwise they will become mouldy. When there is a considerable quantity from three or four makings, it ought to be ground in a mill, and finely sifted. They will be found to be of great use in the making of ordinary brown wash-balls; and with some additions of brown powders for the hair.

Second distillation.

Now return the spirits drawn off into the still, and add ten or twelve gallons of water. Then put in the following ingredients, bruised and mixed: 14 ounces of nutmegs,—4 ounces of cloves,—12 ounces of cinnamon bark,—8 ounces of pimento, and 40 ounces of cassia-lignum. These are to be separately broken or bruised in an iron mortar, until they are about the size of small peas. If there be any dust, it must be sifted from them before they are used. Then take 40 ounces of storax—40 ounces of gum-benjamin,—44 ounces of labdanum, and 40 venellios.

Break and bruise the above also, but make as little dust as possible. Put the dust from these and the foregoing, together, into a coarse muslin bag, which is to be hung in the still, so that the liquor during distillation, may extract all its virtues. The whole are then to remain in the liquor, in a cold state, for forty-eight hours; attention being still paid, to luting and stopping close, as before. At the end of this time, kindle the fire, and work off (slowly at first) until twenty-six gallons are distilled. Mix all the different runnings together in a copper vessel, kept for this purpose only.

Having drawn off, in this second distillation, twenty-six gallons, mix together 10 oz. of spirit of musk,—10 oz. of spirit of ambergris, —1-2 oz. of true oil of lavender,—1-2 oz. of essence of bergamot, and 1-2 oz. of oil of rhodium. Now add to it, in a copper vessel, that will hold forty gallons, six gallons of orange-flower water, and eight gallons of rose-water, recently made. When properly mixed, put all these into the copper vessel, and stir the whole well together. Add to all these a quart of milk, which has stood for a night, and which has had the cream taken clearly off; then agitate and mix the whole well together, and stop the vessel up close, until the time when it is to be used.

The jar ought to have a lock-cock soldered into it, to prevent accidents. This should be placed full two inches from the bottom, in order that the milk, and other impurities may fall to the bottom.

If this honey-water be made in the spring, and if the weather be fair, it will be quite fined down in the course of a month; that is, if it be not opened or disturbed. When, by drawing off a little in a glass, the milk, &c. have fallen down to the bottom, draw the whole off into clean and well seasoned stone, or glass bottles; or into another copper jar. This composition ought never to be drawn off in rainy or cloudy weather; for then the milk is apt to rise. In warm weather it should be kept cool; and, in winter, as warm as possible. When distilled in the winter, the jars ought to be warmed, or otherwise the honey-water will not be fined for five or six months.

This honey-water may keep thirty years.

The ingredients from the second distillation are of much greater value than those from the first, and therefore require more care in the drying. These are of great use for the best sort of gross powders, for *sweet bags*, &c. and, if made into a fine powder, may be made use of with great success, in the best sort of *brown perfumed balls.*

The same powder, with fresh ingredients, makes excellent pastils, to burn; and may be further used in making spirit of benjamin.

Compound spirit of juniper.

Take of juniper-berries, well bruised, 1 lb. —caraway seeds, and sweet fennel seeds, each bruised, 1 1-2 oz.—diluted alcohol, 1 gallon. Macerate for two days, and having added as much water as will prevent empyreuma, draw off, by distillation, one gallon.

Lavender spirit.

Take 14 pounds of lavender flowers, 10 1-2 gallons of rectified spirit of wine, and 1 gallon of water; draw off ten gallons by a gentle fire; or, which is much better, by a sand-bath heat.

Lavender water.

Take 30 gallons of the best wine spirit, pour it into a copper still, placed in a hot water bath, over a clear but steady fire; put to it 6 pounds of the largest and freshest lavender flowers, after having separated them from all stalks and green leaves, which give the lavender water a woody and faint smell. Put no water into the still; close all the junctures well, and let the spirits and flowers stand in a state of digestion for 24 hours; and then, with a gentle fire, draw off 25 or, at most, 26 gallons only, which, as soon as distilled, are to be poured into a copper vessel for keeping. Wooden vessels and cans are to be avoided, as the best parts of the oil and of the spirits, will be absorbed by them, and consequently lost. When the distillation is over, draw out, or quench the fire, and let the remaining spirits and flowers continue in the still until the next day. When the above quantity of 25 or 26 gallons has stood for 4 or 5 days, put to it 10 oz. of true English oil of lavender. Mix the whole well in the jar, by drawing out one or two gallons, and then returning them. Repeat this ten or twelve times, then stop the vessel up close, and do not disturb it for a month, at least.

Lavender water, of the second order.

To the 4 or 5 gallons of the spirits, and the lavender-flowers left in the still, after the distillation mentioned in the last article, add 15 gallons of common proof spirit, 9 or 10 gallons of spring water, 3 pounds of lavender flowers, and 4 oz. of oil of lavender, intimately mixed with loaf-sugar, by powdering it in a glass mortar. Digest the whole, and draw off 25 gallons, proceeding in every respect as before, except that, in this case, no oil is to be added; for, as there is so much water present, the addition of oil would be apt to turn the whole quantity muddy, or of a blueish or opaque colour, which it cannot be easily freed from, without a second distillation.

Lavender water for immediate use.

Mix with 1 gallon of proof spirit, 1 1-4 ounce of true English oil of lavender, which is all that will properly combine with the spirit, without injuring the colour, by rendering it muddy. When the spirit and the oil are properly mixed, they are to be put into glass bottles, which are to be well stopped, and ought to be shaken before used.

Perfumed lavender water.

Distil by a gentle heat in a sand or water bath; or mix and shake frequently during 14 days, the following ingredients:—1 ounce of foreign oil of lavender,—1-2 ditto of English ditto,—1-2 ditto of essence of ambergris, and one gallon of rectified spirit of wine.

Lemon water.

The peel of the lemon, the part used in making this water, is a very grateful bitter aromatic, and, on that account, very serviceable in repairing and strengthening the stomach. Take of dried lemon-peel, 4 lbs.—proof spirit, 10 1-2 gallons, and one gallon of water. Draw off 10 gallons by a gentle fire.

Spirit of peppermint.

Take of the herb of peppermint, dried, 1 1-2 lbs.—proof spirit, 1 gallon,—water, sufficient to prevent burning. Distil off a gallon.

Compound gentian water.

Take of gentian root, sliced, 3 lbs.: leaves and flowers of the lesser centaury, each 8 ounces; infuse the whole in 6 quarts of proof spirit and one quart of water; and draw off the water till the feints begin to rise.

Spirit of scurvey grass.

Take of scurvy grass, fresh gathered and bruised, 15 pounds; horse-radish root 6 pounds; rectified spirit of wine, 1 gallon; and water, 3 pints. Digest the whole in a close vessel 2 days, and draw off a gallon with a gentle fire.

Antiscorbutic water.

Take of the leaves of water-cresses, garden and sea scurvygrass, and brook-lime, each 20 handsful: of pine-tops, germander, horehound, and the lesser centaury, each 16 handsful: of the roots of bryony and sharp pointed dock, each 6 pounds: of mustard seed, 1 1-2 pounds. Digest the whole in 10 gallons of proof spirit. and 2 gallons of water, and draw off by a gentle fire.

ACID LIQUORS,

To make vinegar.

Vinegar is used principally as a sauce and to preserve vegetable substances; but it is employed externally when an over dose of strone wine, spirit, opium, and other narcotic poison has been taken. A false strength is given to it by adding oil of vitriol, or some acid vegetable, as pellitory of Spain, capsicum, &c. It is rendered colourless by adding fresh burned bone black, 6 ounces to a gallon, and letting it stand for two or three days to clear. Mix cider and honey, in the proportion of 1 lb. of honey to a gallon of cider, and let it stand in a vessel for some months, and vinegar will be produced so powerful, that water must be mixed with it for common use.

Another method.—Scheele, a celebrated chemist, has recommended the following receipe: Take 6 spoonsful of good alcohol; to this add 3 pints of milk, and put the mixture into vessels to be corked close. Vent must be given from time to time to the gas of fermentation. In the course of a month, this will produce very good vinegar.

Another.—Put into a barrel of sufficient dimensions a mixture composed of 41 wine pints of water, about 8 pints of whiskey, (*l'eau de vin de grain*) about 2 wine pints of yeast, and 2 pounds of charcoal, and place it in a proper situation for fermentation. At the end of 4 months a very good vinegar will be formed, as clear and as white as water.

Common vinegar.

This is made from weak malt liquor brewed for the purpose: its various strength is, in England, denoted by numbers from 18 to 24.

Another.—To every gallon of water put 1 lb. of coarse Lisbon sugar; let the mixture be boiled and skimmed as long as any scum arises. Then let it be poured into proper vessels: and when it is as cool as beer, when worked, let a toast be rubbed over with yeast be put to it. Let it work about 24 hours, and then put it into an iron-hooped cask, fixed either near a constant fire, or where the summer sun shines the greater part of the day; in this situation it should not be closely stopped up; but a tile, or something similar, should be laid on the bung hole, to keep out the dust and insects. At the end of about 3 months (sometimes less) it will be clear and fit for use, and may be bottled off. The longer it is kept, after it is bottled, the better it will be. If the vessel containing the liquor is to be exposed to the sun's heat, the best time to begin making it is in the month of April.

Wine vinegar.

Take any sort of wine that has gone through fermentation, and put it into a cask that has had vinegar in it; then take some of the fruit or stalk of which the wine has been made, and put them wet into a open-headed cask in the sun, with a coarse cloth over the top of it, for six days—after which, put them in the vinegar, and stir it well about—then put it in a warm place, if in winter, or if in summer, put it in a yard in the sun, with a slate over the bung. When the vinegar is sour enough and fine rack it off into a clean sour cask, and bung it up; then put it in the cellar for use. Those wines that contain the most mucilage are fittest for the purpose.

The lees of pricked wine are also a very proper ingredient in vinegar.

Sugar vinegar.

To each gallon of water add 2 lbs. of brown sugar, and a little yeast; leave it exposed to the sun for six months, in a vessel slightly stopped.

Gooseberry vinegar.

Bruise the gooseberries, when ripe, and to every quart put three quarts of water; stir them well together, and let the whole stand for 24 hours, then strain it through a canvas bag. To every gallon of liquor add 1 lb. of brown sugar, and stir them well together before they are put into the cask. Proceed in all other respects as before. This vinegar possesses a pleasant taste and smell; but raspberry vinegar, which may be made on the same plan, is far superior in these respects. The raspberries are not required to be of the best sort, still they should be ripe and well flavoured.

Currant vinegar.

This is made in the same way as that from gooseberries, only pick off the currants from the stalks.

Primrose vinegar.

To 15 quarts of water put 6 lbs. of brown sugar; let it boil ten minutes, and take off the scum; pour on it half a peck of primroses; before it is quite cold, put in a little fresh yeast, and let it work in a warm place all night; put it in a barrel in the kitchen, and when done working, close the barrel, still keeping it in a warm place.

Raisin vinegar.

After making raisin wine, lay the pressed raisins in a heap to heat, then to each cwt. put 10 gallons of water, and a little yeast.

Cider vinegar.

The poorest sort of cider will serve for vinegar, in managing which proceed thus—First draw off the cider into a cask that has had vinegar in it before; then put some of the apple that have been pressed into it, set the whole in the sun, and in a week or 9 days it may be drawn off into another cask.—This is a good table vinegar.

Vinegar from the refuse of fruits.

Take the skins of raisins after they have been used in making wine, and pour three times their own quantity of boiling water on them; stir them well about, and then set the cask in a warm place, close covered, and the liquor, in a week, when drawn off from its sediment, put into another cask, and well bunged down, will be a good vinegar for the table.

Vinegar from the refuse of bee-hives.

When honey is extracted from the combs, by means of pressure, take the whole mass, break and separate it, and into each tub or vessel put one part of combs, and two of water; place them in the sun, or in a warm place, and cover them with cloths. Fermentation takes place in a few days, and continues from 8 to 12 days, according to the higher or lower temperature of the situation in which the operation is carried on. During the fermentation, stir the matter from time to time and press it down with the hands, that it may be perfectly soaked. When the fermentation is over, put the matter to drain upon sieves or strainers. At the bottom of the vessels will be found a yellow liquor, which must be thrown away, because it would soon contract a disagreeable smell, which it would communicate to the vinegar. Then wash the tubs, put into them the water separated from the other matter; it immediately begins to turn sour; when the tubs must be again covered with cloths, and kept moderately warm. A pellicle or skin is formed on their surface, beneath which the vinegar acquires strength; in a month's time it begins to be sharp; it must be left standing a little longer, and then put into a cask; of which the bung-hole is left open. It may then be used like any other vinegar.

To strengthen vinegar.

Suffer it to be repeatedly frozen, and separate the upper cake of ice, or water, from it.

All vinegars owe their principal strength to the acetic acid they contain; but vinegar of wine contains also a tartar, a small portion of the malic acid, alcohol, and colouring matter: that of cider contains merely the malic acid, little or no alcohol, and a yellowish colouring matter.

Vinegars from orange and elder flowers, clove, gilliflowers, musk roses, &c.

Dry an ounce of either of the above flowers, (except the orange flowers, which will not bear drying,) for two days in the sun; then put them into a bottle, pour on them a pint of vinegar, closely stop the bottle, and infuse 15 days in moderate heat of the sun. Vinegars of any other flowers, as tarragon, &c. may be made in a similar manner.

To prepare ice vinegar.

Saturate 3 or 4 pounds of purified potash with wine or beer vinegar which has been distilled over charcoal powder; evaporate the saturated liquor to the consistence of a dry powder, of which put 3 lbs. accurately weighed, when still warm into a glass, previously heated, and shut it with a glass-stopper. Then pour 3 lbs. of sulphuric acid into a retort, provided on its upper part with a pipe, and join to it a receiver, large enough for containing about 20 pints of water. Begin to add to the sulphuric acid the above salt in small portions: shaking and stirring it frequently. After having mixed all the salt, add by degrees 1 lb. more of sulphuric acid, and shut the pipe with a wet bladder: suffer the whole to stand quietly one night. The next morning place the retort into the sand-pot of a furnace so deeply, that the sand between the bottom of the pot and the retort be only about half an inch thick; put the receiver into a refrigeratory filled with very cold water, after which apply a gentle fire. About an hour after, the distillation commences by white fumes appearing in the vessels, at which time the fire must be very carefully managed. The drops that go over may succeed one another quickly, without any danger of the vessels being cracked: but be very careful that no coherent streams run over, and likewise take care that the thick and white fumes only lodge in the lowest part of the receiver; and when they begin to rise, particularly with a whirling motion, take the fire immediately out of the furnace. It is besides necessary to refrigerate often the upper part of the receiver with cold water, or which is still better, with snow or ice. The ending of the distillation is known by the disappearance of the white fumes, by the drops running over much slower, and particularly by the liquefaction of the residuum to a black frothing fluid, that goes easily over into the receiver. At the moment of the liquefying and frothing of that substance, the receiver ought to be taken off, and another put on, into which 5 or 6 dr. of a much weaker and disagreeably smelling acetous acid will go over; that, however, may be used for purifying the ice vinegar from the adherent sulphurous acid; when, after having diluted with water, it is saturated with barytes, filtrated, and evaporated to dryness. The residuum is ground to a fine powder, and together with charcoal powder, added to the ice vinegar; after which the mixture ought to be rectified over a gentle fire, to the dryness of the residuum. Of 3 lbs. of acetate of kali, 22 oz. of ice-vinegar were obtained by this method.

To make quass.

Mix rye flour and warm water together, and leave it till it has turned sour. This vinegar is much drank in Russia; it looks thick and unpleasant at first, but becomes agreeable by use.

Distilled vinegar.

This is obtained from vinegar by distillation, rejecting the 4th or 8th part that comes over first, and avoiding its acquiring a burnt flavour.

Distilled vinegar is weaker than the common, but is used sometimes in pickles, where its want of colour is an advantage.

Improved distilled vinegar.

Obtained from wood distilled in large iron cylinders for the manufacture of charcoal for gunpowder; when rectified it is used for all the purposes of distilled vinegar.

To deprive vinegar and other vegetable liquids of their colour.

To take away the colour of vinegar, a litre of red wine vinegar, cold, is mixed with 45 grammes of bone-charcoal, in a glass vessel. Shake this mixture from time to time, and in two or three days the colour completely disappears. When the process is to be performed in the large way, throw the charcoal into a cask of vinegar, which must be stirred from time to time. The highest coloured red wines treated in the same manner become perfectly limpid. Ivory black possesses the same property as bone black.

To prepare the charcoal.

Fill a crucible with the most compact parts of ox and sheep bones, lute the cover, carefully leaving only a small opening at the top, place the crucible on a forge fire, and heat it gradually till red, when the flame from the oily and gelatinous parts has ceased, diminish the opening and suddenly raise the fire, when cold, reduce the charcoal or porphyry to fine powder.

To procure pyroligneous acid.

This acid is procured from any kind of green wood (such as cord wood,) used for making charcoal; a cord of wood (worth in Monmouthshire about 8s.,) will produce about eighty gallons. It is obtained in the following manner:—A brisk oven is filled with coal or wood, until it becomes sufficiently hot to heat an oven over it to that degree as to reduce green wood to a charcoal. The upper oven should be closely stopped except a tube at the top to carry off the steam or acid, which tube is passed through water, and the steam thus condensed forms the acid.

To prepare the same.

Place a large cast-iron cylinder, or retort (similar to those used for the production of carburetted hydrogen gas), in a furnace, so that it may receive as much heat, all round, as possible. One end of this cylinder must be so constructed as to open and shut, to admit wood, and exclude the air.

Oak in pieces about a foot in length is to be put into the cylinder, which is to be filled as full as possible, without being wedged, and the door must be shut close to exclude air; from the cylinder let a worm run through cold water to condense the acid; by this it is conveyed to a large cask placed on one end, where there is a pipe to carry it from that to two or three more; thus it is completely secured from flying off in the vaporous state. The fire is now to be raised to a great heat, sufficiently powerful to convert the wood completely into charcoal. When the acid ceases to come over, the fire is to be taken out, and the mass of wood left to cool in the confined state, when it becomes perfect charcoal. In the first cask, tar is chiefly contained with the acid, it precipitates to the bottom, and is drawn off by a cock; it is afterwards boiled in an iron boiler to evaporate the acid, before it is fit for use. If the acid is not strong enough, it is put into large square vats about six inches deep, for the purpose of making a large surface, to evaporate a part of the water contained in the acid more speedily by a slow heat. These vats are bedded on sand upon the top of a brick stove, where a gentle heat is applied; thus it may be procured in a pretty strong state.

This acid, now well known in Britain as an article of commerce, and in its native state is a liquid of the colour of white wine, possesses a strong acid and slightly astringent taste, combined with an empyreumatic smell. When allowed to remain in a state of rest for eight or ten days, tar of a black colour subsides, and the acid is then comparatively transparent. To purify it further, it undergoes the process of distillation, by which it is freed from a still greater portion of the tar, with which it is combined, and is thus rendered still more transparent. But though the process of distillation be repeated without end, it will never be freed from the volatile oil with which it is combined, and which is the cause of the empyreuma constantly attending it. In short, it contains the same properties for the preservation of animal matters from putrefaction as smoking them by wood does, which is practised at present by the most barbarous nations, and which has been handed down from the remotest ages of antiquity.

At a recent aniversary of the Whitehaven Philosophical Society, two specimens of meat cured with the pyroligneous acid were exhibited by one of the members. They were prepared on the 7th of September, 1819. One had been hung up at home, and the other had been sent out by a vessel to the West Indies, to try the effect of climate upon it, and brought back on the return of the ship to that port. They were tasted by all present, and pronounced to be perfectly sweet, fresh, and fit for use, after a lapse of 15 months.

Besides its antiseptic use, this acid is employed instead of acetate of lead (sugar of lead,) by the calico printers, to make their acetate of alumine, or iron liquor. Though it is not sufficiently pure, it does well enough for blacks, browns, drabs, &c., but for yellows or red it is not so good, owing to the oil and tar which is in combination with it.

To make strong acetous acid.

Take of vitriol, calcined to whiteness, 1 lb. —sugar of lead, 10 drachms,—Rub together and distil.

Another.—Take of verdigris, 2 lbs. Dry it in a water-bath, then distil in a sand-heat, and re-distil the produced liquor. Its specific gravity is about 1.050.

Another.—Take of sugar of lead, 7 lbs.—oil of vitriol 4 1-2 lbs. Distil 2 1-2 lbs. This is used to make aromatic vinegar.

The strength of distilled acetous acids is examined by *Tailor's Revenue Acetometer*, which consists in saturating a sample of the acid with slaked lime, and then ascertaining the specific quantity of the solution. The best malt vinegar, No. 24, contains about five per cent. real acetous acid, and is taken as the standard or proof acid, 200 grains of which will saturate 29 grains of well-crystallized subcarbonate of soda. The best common distilled vinegar is about half this strength. The pyroligneous acid may be procured of any degree of concentration, from 6 degrees, or 2.898 per cent. of acid, up to 130 deg. or 6.309 per cent. of acid, or even higher. Dr. Powell states, that a fluid ounce of the London College distilled vinegar ought to dissolve at least 13 grains of white marble, or 39.67 grains of crystallized subcarbonate of soda, that is, 6 deg. of the Revenue Acetometer. Acetic acid, containing 45 per cent. of real acid, dissolves camphor and the essential oils very readily.

Acid of ants.

Take of ants, 1 lb.—boiling water, 4 lbs. Infuse for three hours, press out the liquor, and strain. This is an excellent stimulant, and is used as a lotion in impotency.

Honey water for the hair.

Take of honey, 4 lbs.—very dry sand, 2 lbs. Mix and put into a vessel that will hold five times as much; distil with a gentle heat a yellowish acid water: this acid greatly encourages the growth of hair.

Spirit of salt or marine acid.

Take of common salt, 10 lbs.—common clay, 20 lbs.—water sufficient to make them into balls. Distil while moist, with a violent heat, and rectify by re-distillation.

Another method.—Take of dried common salt, 24 lbs.—oil of vitriol 20 lbs.—water, 6 lbs. Mix, and distil into 12 lbs. more of water, kept cool; when distilled in an iron pot with a stone-ware head, all the water is put into the receivers. A bottle that holds 6 oz. of water, ought to hold 7 ounces of this acid, and an ounce measure of it should dissolve 3 drachms and 2 scruples of limestone, which will shew if it is free from oil of vitriol.

Strong spirit of nitre.

Take of nitre 6 lbs.—oil of vitriol 4 lbs. Distil to dryness. A bottle that holds 4 oz. of water, ought to hold 6 oz. of this acid, and an ounce measure of it, diluted with water, should dissolve 7 drachms of limestone.

Another.—Take of nitre 1 lb.—clay, or brick-dust, 4 lbs. Mix and distil.

Colourless spirit of nitre.

Take of nitre, very pure, and dried,—oil of vitriol, each 2 lbs. Distil till red fumes appear; re-distil from nitre, 1 oz. This will produce 4 lbs.

Double aqua-fortis.

Take of spirit of nitre, 3 lbs.—water 2 lbs. —Or, a sufficient quantity that a bottle holding 6 ounces of water shall hold 8 ounces of this acid.

Another.—Take of green vitriol calcined almost to redness, of nitre, each equal portions. Distil.

Common aqua-fortis.

Take of nitre, and green vitriol not calcined, each 6 lbs.—green vitriol, calcined, 3 lbs. Distil.

Another.—Take of spirit of nitre, and distilled water, of each equal portions, by weight. A bottle that holds 6 1-4 oz. of water, should hold 8 oz. of this acid.

Simple aqua-fortis.

Take of green vitriol 2 lbs.—nitre, 1 lb. Distil.

Another.—Take of spirit of nitre, 2 lbs.—water, 3 lbs. or a sufficient quantity that a bottle holding 4 1-2 oz. of water should hold 5 oz. of this acid.

The stronger kinds of this acid are used as a caustic for warts, *&c.* particularly by farriers, for which the addition of oil of vitriol is an advantage. The accidental mixture of spirit of salt, arising from impurities in the nitre, may be got rid of by dissolving refined sugar in some of the acid, pouring off the clear, and dropping it into the remainder as long as any precipitate takes place.

Aqua regia.

Take of spirit of nitre, 16 oz.—common salt, 4 oz. Dissolve.

Another.—Take of spirit of nitre, 16 oz.—sal ammoniac, 4 oz. Dissolve.

Common aqua regia.

Take of spirit of salt, 2 lbs.—spirit of nitre, 1 lb. This will dissolve gold.

Dephlogisticated spirit of salt.

Take of common salt, 3 lbs.—manganese, 1 lb.—oil of vitriol, 2 lbs—water, 1 lb. Distil, placing a sufficient quantity of water in the receiver.

This spirit is of a pale greenish yellow, and scarcely heavier than water. It bleaches linen, straw, and takes out fruit spots, iron moulds, or ink marks.

MISCELLANEOUS BEVERAGES.

To make ginger beer.

Take of good Jamaica ginger, 2 1-2 oz.—moist sugar, 3 lbs.—cream of tartar, 1 oz.—the juice and peel of two middling sized lemons,—brandy, 1-2 pint,—good solid ale yeast, 1-4 pint,—water, 3 1-2 gallons. This will produce 4 1-2 dozen of excellent ginger beer, which will keep twelve months. Bruise the ginger and sugar, and boil them for 20 or 25 minutes in the water, slice the lemon and put it and the cream of tartar into a large pan; pour the boiling liquor upon them, stir it well round, and when milk warm, add the yeast; cover it over, let it remain two or three days to work, skimming it frequently; then strain it through a jelly-bag into a cask, add the brandy, bung down very close, and at the end of a fortnight or three weeks, draw it off and bottle, and cork very tight; tie the cork down with twine or wire. If it does not work well at first, add a little more yeast, but be careful of adding too much, lest it taste of it.

Spruce beer.

Take, if white is intended, 6 lbs. of sugar; if brown, as much treakle, and a pot of spruce, and ten gallons of water.

This is also managed in the same way as ginger beer, except that it should be bottled as soon as it has done working.

Brown spruce beer.

Pour 8 gallons of cold water into a barrel, and then boiling 8 gallons more, put that in also; add 12 lbs. of molasses, with about 1-2 a lb. of the essence of spruce; and on its getting a little cooler, 1-2 a pint of good ale yeast. The whole being well stirred or rolled in the barrel, must be left with the bung out for two or three days; after which the liquor may be immediately bottled, well corked up, and packed in saw-dust or sand, when it will be ripe, and fit to drink in a fortnight.

Remember, that it should be drawn off into quart stone bottles, and wired.

White spruce beer.

For a cask of 6 gallons, mix well together 3-4 lb. of the purest essence of spruce, 7 lbs. of loaf sugar made into a clarified syrup, and about 1 1-2 gallons of hot water; and when sufficiently stirred and incorporated, put it into the cask, and fill up with cold water. Then add about 1-4 of a pint of good ale yeast, shake the cask well, and let it work for three or four days; after which, bung it up. In a few days it may be bottled off after the usual manner, and in a week or ten days it will be fit for use. If, on bunging it close, about 1-4 of an oz. of isinglass, first dissolved in a little of the warmed liquor, or in cider, be stirred in, by way of fining, it will acquire a superior degree of clearness. In proportion to the coldness of the weather, the quantity of yeast should be increased. Some, instead of yeast, use ale or beer-grounds the first time of making, and afterwards the grounds of their former spruce beer. In warm weather, very little ferment is requisite.

Seltzer water.

Take of water any quantity. Impregnate it with about ten times its volume of carbonic acid gas, by means of a forcing pump.

Liquid Magnesia.

Take of water, 1 gallon,—carbonate of magnesia, 3 drachms, and impregnate it as above.

Potass water.

Take an ounce of subcarbonate of potass, and impregnate as above.

Soda water.

Take 2 ounces of subcarbonate of soda, and impregnate as above.

Portable lemonade.

Take of tartaric acid, 1-2 oz.—loaf sugar 3 oz.—essence of lemon, 1-2 drachm. Powder the tartaric acid, and the sugar very fine, in a marble or wedgewood mortar, (observe never to use a metal one) mix them together, and pour the essence of lemon upon them, by a few drops at a time, stirring the mixture after each addition, till the whole is added, then mix them thoroughly, and divide it into twelve equal parts, wrapping each up separately in a piece of white paper. When wanted for use, it is only necessary to dissolve it in a tumbler of cold water, and fine lemonade will be obtained, containing the flavour of the juice and peel of the lemon, and ready sweetened.

Nutritious dietetic composition.

Pulverize equal quantities of sago and *potent cocoa;* mix them, and stir a table-spoonful in a pint of milk, to which now add a pint of boiling water. Boil the whole for a few minutes, frequently stirring. Sugar to be added according to taste. This breakfast, with bread and butter, &c. &c. suits children and adults.

Sassafras cocoa.

The fruit of the *sassafras-tree* is highly esteemed in many parts of South America, as a nutritious article of diet.

Its substance is the same as that of cocoa; and, by means of heat, is convertible into chocolate, but in this process, its aromatic quality is dissipated. This nut, in a ground state, is employed in the same manner as cocoa or coffee, by boiling it in water or milk: but on account of its aromatic quality, being very volatile, it requires to be boiled in a pot with a close cover, and not for so long a time as is requisite for cocoa. Its aromatic virtue renders it very pleasant to the palate, and agreeable to the stomach; and, at the same time, possessing the well-known correcting properties of the sassafras root, and the nutritious virtues of cocoa, it becomes a valuable article of diet to a great variety of invalids. It has been found to recruit exhausted strength more rapidly than either cocoa, chocolate, or any farinaceous substances, and to sit lighter on the stomach than either animal or vegetable jellies.

To make chocolate.

Roast the cocoa in a frying-pan, placed on a clear fire; and having afterwards cleared them of the husks, the nuts must be first powdered coarsely, and afterwards beaten in an iron mortar, the bottom of which is made pretty hot, by placing it on the fire, till the whole runs into a thick kind of oil. In this state it must be poured into thin moulds of any size or shape that is agreeable; and when cold, the cakes may be taken out for use. The Spaniards mix with their cocoa nuts too great a quantity of cloves and cinnamon, besides other drugs without number, as musk, ambergris, &c. The Parisians use few or none of these ingredients; they only choose the best nuts, which are called *caracca,* from the place from whence they are brought; and with these they mix a very small quantity of cinnamon, the freshest vanilla, and the finest sugar, but very seldom any cloves. Chocolate, fresh from the mill, as it cools in the tin pans into which it is received, becomes strongly electrical: and retains this property for some time after it has been turned out of the pans, but soon loses it by handling. The power may be once or twice renewed by melting it again in an iron ladle, and pouring it into the tin pans as at first; but when it becomes dry and powdery, the power is not capable of being revived by simple melting: but, if a small quantity of olive oil be added, and well mixed with the chocolate in the ladle, its electricity will be completely restored by cooling it in the tin pan as before.

Another method.—As the pleasantness of chocolate depends, in a great measure, on the method of preparing it for the table, it is necessary that the strictest attention be paid to the following simple direction. To make this chocolate, put the milk and water on to boil; then scrape the chocolate fine, from one to two squares to a pint, to suit the stomach; when the milk and water boils, take it off the fire; throw in the chocolate; mill it well, and serve it up with the froth; which process will not take 5 minutes. The sugar may either be put in with the scraped chocolate or added afterwards. It should never be made before it is wanted; because heating again injures the flavour, destroys the froth, and separates the body of the chocolate; the oil of the nut being observed, after a few minutes' boiling, or even standing long by the fire, to rise to the top, which is the only cause why this chocolate can offend the most delicate stomach.

To make native tea.

The infusion of good well-made meadow-hay in boiling water, in the manner of tea, about three quarters of an ounce for two or three persons, is a beverage for the fasting and evening refection, as much superior to the dried leaves of China, as gold or silver are superior to copper and lead.

This native tea is as healthful as it is grateful to the palate; it is saccharine and aromatic, instead of bitter and empyreumatic; it is stimulating to the spirits in the morning, and composing to the nerves at night; it is antibilious, and acts with a mild, but sensible effect, at first, on all the secretions, promotes digestion, and creates appetite.

Substitute for tea.

In consequence of the injurious effects on the stomach and nervous system, produced by the leaves of the oriental shrub imported into this country, under the name of *tea*, mixtures of British herbs have been recommended as a substitute for tea and coffee for breakfast, and an evening repast. An infusion of the following composition, lately recommended by an eminent physician of Edinburgh, has since been found more pleasant to the palate, and more salubrious as an article of diet, than either of the compositions of herbs. It is an excellent nervous stomachic, and in cases of indigestion, or what is termed bilious "affections" arising either from debility, or nervous irritability, it has proved highly beneficial after stomachic bitters had entirely failed. It has, likewise, this important advantage over tonic medicines, and foreign tea and coffee, that its long continued use will not injure the stomach; but, on the contrary, by keeping up healthy digestion, and by quieting the nerves, is likely to prevent the organic diseases of the stomach, which of late years have apparently increased in Europe.

Take of the heels of unfolded petals of the red rose, dried, 5 parts,—rosemary leaves, do. 1 do.—balm leaves, do. 2 do. Mix.

A desert spoonful of this composition is sufficient for half a pint of infusion. It is made in the same manner as tea, with sugar and cream, or milk. It is sold at 2*s.* and 9*d.* a pound,—one pound will go as far as two pounds of tea.

Another.—In Germany the leaves of strawberry flowers are substituted for green tea. The following are the directions for preparing them. The leaves with the flowers are to be gathered in the spring, while they are young, and only the smoothest and cleanest leaves selected, as they are not to be washed. They must be dried in the air, but not in the sun, as drying them in the sun would lessen their flavour. To these leaves the Germans give the appearance of China tea, by first pinching their stalks clean off, then warming the leaves over the fire, rolling them up in the hand while they remain flexible, and drying them thus rolled. When the leaves are thoroughly dried, the tea is fit for use, and on being made exactly in the same manner as China green tea, it is hardly possible to discover the difference. The young and tender leaves of the sloe tree or black thorn, when dried afford a good substitute for foreign tea.

Substitute for coffee, cocoa, &c.

The ground sassafras nut is an excellent substitute for coffee, cocoa, &c. for breakfast and supper. It is not only nutritious, but a more efficacious corrector of the habit, in cases of eruptions of the skin and scrofula, than the sassafras wood, or the compound decoction of sarsaparilla. As a powerful preventive of cutaneous affections, it is particularly valuable. It is also an excellent article of diet, for rheumatic, gouty, and asthmatic invalids.

Another.—In America the leaves of the herb, commonly called labradore (ledum lilifolia) are generally used for breakfast, instead of the Chinese tea. It is a grateful aromatic bitter, and is highly salutary and invigorating. It might easily be cultivated in this country, and would flourish best in poor light soils.

Other substitutes for tea and coffee.

The ill effects of drinking much tea and coffee are numerous: they relax the nervous system, and are some of the causes which occasion the palsy. Coffee is made of the roasted berries of a foreign plant, of an astringent quality. Tea is made of the leaves of an exotic plant, of a relaxing quality. Coffee and tea have a pleasant taste, when mixed with sugar and milk; and, used in moderation, are harmless to those who have plenty of cream or new milk to mix with them. Tea is the universal breakfast in England; but poor people can only afford to buy the worst sort, which is frequently adulterated.—That tea affects the nerves, is evident, from its preventing sleep, occasioning giddiness and dimness of sight; it is bad for persons troubled with wind or bile.

The raspings of bread will make equally as good a breakfast as Mr. Hunt's powder, and is perfectly wholesome. Any person may make this substitute for coffee or tea, without being subjected to a fine, as no law can be made to prevent people from using their bread in any form they please. All well-baked bread has a hard crust, mostly of a scorched dark colour:—with a bread rasp or grater, rub the crust off, which will then appear nearly like ground coffee. Three or four table spoonsful of this powder are sufficient when mixed with sugar and a little milk, if it can be had, to make a liquid for breakfast for one person. Put the bread powder into water, let it boil a few minutes, and it will be fit for use.

Milk and water and a little sugar, are more wholesome for breakfast, than tea or coffee. Take one fourth part of a pint of milk, and mix it with three quarters of a pint of water, add as much sugar as will make it as sweet as milk, boil it, and pour it into a basin upon some bread cut small. To make herb tea, take dried balm, mint, and agrimony, in equal quantities, with a little sage and rosemary, if they can be got; cut them small, and use them in the same manner as tea. Water gruel is more nourishing and wholesome than tea or coffee.

Another.—Beech mast, or the beech tree, which is an oily farinaceous nut, and was used in diet, in an early age, may be used as a substitute for coffee, when roasted. Well dried, it makes a wholesome bread, and, in this condition, it has served for subsistence, in times of scarcity; it is now, however, used only for fattening hogs, poultry, &c.

A great quantity of oil may be separated from the beech mast, by expression. In France it is procured in large quantities, and used at table, instead of olive oil. It possesses an advantage which the latter has not, of keeping a long time, without turning rancid.

Another.—Roast any quantity of horse beans in a clean frying pan, over a clear fire till they begin to darken in colour, and then from the point of a knife, continue putting small bits of honey among them, stirring them all the while till they become of a deep chesnut brown. On taking them off the fire, to a quart of beans immediately, put an ounce of cassia-buds into the pan, and stir them about till they get cool. After being ground in the manner of coffee, few persons will detect the difference.

Rye torrefied with a few almonds, which furnish the necessary proportion of oil, may also be employed as a substitute for coffee. Wheat may be substituted for beans.

Another.—The yellow beet root when sliced and dried in a kiln, and especially if ground with a small quantity of Turkey or West India coffee, will furnish an excellent substitute for either. It requires much less sugar than foreign coffee, and is somewhat stronger. Those who cultivate it should not strip the plant of its leaves, for feeding cattle, as is generally practised, for this will injure the growth of the plant, nnd materially alter the qualities of the juice.

To make acorn coffee.

A pleasant beverage is drank in Germany, called the acorn coffee, and is made as follows:

Take sound ripe acorns, peel off the shell or husk, divide the kernels, dry them gradually, and then roast them in a close vessel, or roaster, keeping them continually stirring. Care must be taken not to burn or roast them too much. Take of these roasted acorns, ground like other coffee, half an ounce alone, or mixed with a drachm of other coffee, and sweeten with sugar, with or without milk.

Acorns have always been esteemed a wholesome and strengthening nutriment for man, and their medicinal qualities have been found to cure the slimy obstructions of the viscera, and to remove nervous complains, when other medicines have failed—for though acorns are looked upon to be so great an astringent as to be sparingly used, either externally or internally, by being roasted, they lose their astringent quality, and hence have no more that effect than coffee. This coffee is also particularly efficacious with respect to women whose complaints arise from disorders peculiar to their sex.

Another method.—As the acorn is deficient of the oleaginous principles inherent to coffee, this may be remedied by the following process, and the fruit of the oak may be then recommended. Let the acorns be toasted brown, then add fresh butter, in small pieces to them, while hot, in the ladle. Stir them with care, or cover the ladle and shake it, that the whole may be well mixed.

To make coffee.

The best coffee is imported from Mocha. It is said to owe much of its superior quality to being kept long; attention to the following circumstances is likewise necessary. 1. The plant should be grown in a dry situation and climate. 2. The berries ought to be thoroughly ripe before they are gathered. 3. They ought to be well dried in the sun; and 4. Kept at a distance from any substance, (as spirits, spices, dried fish, &c.) by which the taste and flavour of the berry may be injured.

To drink coffee *in perfection*, it should be made from the best Mocha berries, carefully roasted, and after cooling for a few minutes, reduced to powder, and immediately infused; the tincture will then be of a superior description. But for common use, the coffee of our own plantations is, in general, of very good quality, and the following mode of preparing it may be adopted:

1. The berries should be carefully roasted, by a gradual application of heat, scorching, but not burning them.

2. Grinding the coffee has been found preferable to pounding, because the latter process is thought to press out, and leave on the sides of the mortar, some of the richer oily substances, which are not lost by grinding.

3. A filtrating tin, or silver pot, with double sides, between which hot water must be poured, to prevent the coffee from cooling, as practised in Germany, is the best machine to be used. Simple infusion in this implement, with boiling water, is all that is required to make a cup of good coffee; and the use of isinglass, the white of eggs, &c. to fine the liquor is quite unnecessary. By this means, also, coffee is made quicker than tea.

In England, too little powder of the berry is commonly given. It requires about one small cup of coffee-powder to make four cups of tincture for the table. This is at the rate of an ounce of good powder to four common coffee cups. When the powder is put in the bag, as many cups of boiling water are poured over it as may be wanted, and if the quantity wanted is very small, so that after it is filtrated it does not reach the lower end of the bag, the liquor must be poured back three or four times, till it has acquired the necessary strength.

By following these plain directions, it is to be hoped that a wholesome and valuable production of our own colonies will come into more general use; and that foreigners will no longer have any ground to assert, that they very rarely meet with a cup of tolerable coffee in England.

Another method.—Pour a pint of boiling water on an ounce of coffee; let it boil five or six minutes, then pour out a cupful two or three times, and return it again; put two or three isinglass chips into it; or a lump or two of fine sugar; boil it five minutes longer, set the pot by the fire to keep hot for ten minutes, and the coffee will be beautifully clear. Some like a small bit of vanilla. Cream should always be served with coffee, and either pounded sugar candy, or fine Lisbon sugar. For foreigners, or those who like it extremely strong, make only eight dishes from three ounces. If not fresh roasted, lay it before a fire till hot and dry; or put the smallest bit of fresh butter into a preserving pan, when hot throw the the coffee into it, and toss it about till it be freshened.

Coffee most certainly promotes watchfulness; or, in other words, it suspends the inclination to sleep. To those, therefore, who wish not to be subject to this inclination, coffee is undoubtedly preferable to wine, after dinner, or perhaps to any other liquor.

Were coffee substituted instead of wine immediately after dinner, it seems more than probable that many advantages would flow from it, both to the health of individuals and general economy; and it seems not improbable that by deferring coffee, or tea, so late as is usually practised, we interrupt digestion, and add a new load of matter to that already in the stomach, which, after a full meal, is not a matter of indifference.

Persons afflicted with asthma, have found great relief and even a cure, by drinking very strong coffee, and those of a phlegmatic habit would do well to take it for breakfast. It is rather of a drying nature, and with corpulent habits it would also be advisable to take it for breakfast.

Arabian method of preparing coffee.

The Arabians, when they take their coffee off the fire, immediately wrap the vessel in a wet cloth, which fines the liquor instantly, makes it cream at the top, and occasions a more pungent steam, which they take great pleasure in snuffing up as the coffee is pouring into the cups. They, like all other nations of the East, drink their coffee without sugar.

People of the first fashion use nothing but Sultana coffee, which is prepared in the following manner. Bruise the outward husk or dried pulp, and put it into an iron or earthen pot, which is placed upon a charcoal fire; then keep stirring it to and fro, till it becomes a little brown, but not of so deep a colour as common coffee; then throw it into boiling water, adding at least the fourth part of the inward husks, which is then boiled altogether in the manner of other coffee. The husks must be kept in a very dry place, and packed up very close, for the least humidity spoils the flavour. The liquor prepared in this manner is esteemed preferable to any other. The French, when they were at the court of the king of Yemen, saw no other coffee drank, and they found the flavour of it very delicate and agreeable; there was no occasion to use sugar, as it had no bitter taste to correct.

In all probability the Sultana coffee can only be made where the tree grows; for as the husks have little substance, if they are too much dried, in order to send them to other countries, the agreeable flavour they had when fresh, is greatly impaired.

Improvement in making coffee.

The process consists in simmering over a small but steady flame of a lamp. To accomplish this a vessel of peculiar construction is requisite, it should be a straight-sided pot, as wide at top as at bottom, and inclosed in a case of similar shape; to which it must be soldered air tight at the top. The case to be above an inch wider than the pot, and descended somewhat less than an inch below it. It should be entirely open at the bottom, thus admitting and confining a body of hot air round and underneath the pot. The lid to be double, and the vessel, of course, furnished with a convenient handle and spout.

The extract may be made, either with hot water or cold. If wanted for speedy use, hot water, not actually boiling, will be proper, and the powdered coffee being added, close the lid tight, stop the spout with a cork, and place the vessel over the lamp. It will soon begin to simmer, and may remain unattended, till the coffee is wanted. It may then be strained through a bag of stout, close linen, which will transmit the liquid so perfectly clear as not to contain the smallest particle of powder.

Though a fountain lamp is preferable, any of the common small lamps seen in every tin shop, will answer the purpose. Pure spermaceti oil is required, and if the wick be too high, or the oil not good, the consequence will be smoke, soot, and extinction. The wick should be little more than one eighth of an inch high. In this process, no trimming or other attention is required. It may be left to simmer and will continue simmering all night, without boiling over, and without any sensible diminution of quantity.

Parisian method of making coffee.

In the first place let the coffee be of prime quality,—grain, small, round, hard and clear: perfectly dry and sweet; and at least three years old—let it be gently roasted until it be of a light brown colour; avoid burning, for a single scorched grain will spoil a pound. Let this operation be performed at the moment the coffee is to be used; then grind it while it is yet warm, and take of the powder an ounce for each cup intended to be made; put this along with a small quantity of shredded saffron, into the upper part of the machine, called a *grecque;* that is, a large coffee pot with an upper receptable made to fit close into it, the bottom of which is perforated with small holes, and containing in its interior two moveable metal strainers, over the second of which the powder is to be placed, and immediately under the third; upon this upper strainer, pour boiling water and continue doing so gently until it bubbles up through the strainer; then shut the cover of the machine close down, place it near the fire, and so soon as the water has drained through the coffee, repeat the operation until the whole intended quantity be passed.—Thus all the fragrance of its perfume will be retained, with all the balsamic and stimulating powers of its essence; and in a few moments will be obtained—without the aid of hartshorn shavings, isinglass, whites of eggs, or any of the trash with which, in the common mode of preparation, it is mixed—a beverage for the gods. This is the true Parisian mode of preparing coffee; the invention of it is due to M. de Belloy, nephew to the Cardinal of the same name.

Coffee milk.

Boil a dessert spoonful of ground coffee in about a pint of milk, a quarter of an hour; then put into it a shaving or two of isinglass, and clear it; let it boil a few minutes, and set it on the side of the fire to fine. This is a very fine breakfast, and should be sweetened with real Lisbon sugar.

Those of a spare habit, and disposed towards affections of the lungs, would do well to make this their breakfast.

To make mum.

Mum is a kind of malt liquor, much drunk in Germany and formerly in England. The name commonly occurs in the statutes relating to exciseable liquor.

Take 63 gallons of water that has been boiled into a third part, brew it with seven bushels of wheatened malt, one bushel of oat malt, and one bushel of ground beans; when it has worked or fermented awhile in a hogshead not too full, put into it of inner rind of fir, 3 lbs. tops of fir and birch, 1 lb. *carduus benedictus*, 3 handsful, flowers from *solis*, a hand or two; burnet, betony marjoram, pennyroyal, wild thyme, of each a handful; of elder flowers, two handsful, seeds of cardamon, bruised, 30 ounces; barberries, bruised, 1 ounce.

When the liquor has done working, fill it up, and at last, put into the hogshead 10 new laid eggs; stop it up close, and in two years it will be fit for use.

MUCILAGINOUS OILS.

To make oil of sweet almonds.

It is usually made from bitter almonds for cheapness, or from old Jordan almonds, by heat, the oil from which soon grows rank, while that from fresh Barbary almonds, drawn cold, will keep good for some time. The almonds are sometimes blanched by dipping in boiling water or by soaking some hours in cold water, so as to part with their skin easily; but are more usually ground to a paste. which is put into canvas bags, and pressed between iron plates, in a screw press, or by means of a wedge; 1 cwt. of bitter almonds unblanched, produces 46 lbs. oil; the cake pays for pressing.

Nut oil

Is obtained from the kernel of the hazel nut, and is very fine; it is substituted for oil of ban; as it will keep better than that of almonds, it has been proposed to be substituted for that oil; it is drank with tea, in China, probably in lieu of cream, and is used by painters, as a superior vehicle for their colours.

Oil of mace

Is obtained from nutmegs by the press; it is buttery, having the smell and colour of mace, but grows paler and harder by age: 2 lbs. of nutmegs in Europe, will yield 6 oz. of this oil.

True oil of mace by expression.

This oil is red, remains always liquid, or soft, has a strong smell of mace, sub-acid taste, and is imported in jars or bottles, the lower part being rather thicker than the top; 1 1-2 lbs. of mace will yield in Europe an ounce and a half, troy, of oil.

Olive, salad, or sweet oil.

This is the most agreeable of all the oils; it is demulcent, emollient, gently laxative, and is also used as an emetic with warm water; dose, 1 oz. troy, or a large spoonful; also externally, when warm, to the bites of serpents, and when cold, to tumours and dropsies. Rank oil is best for plaisters: but fresh oil makes the best hard soap.

Castor oil.

This is either imported from the West Indies, where it is obtained by decoction with water, 10 lbs. of seeds yielding 1 lb. of oil; or from the East Indies, where it is obtained by grinding in a mortar, with a hole in the side for the supernatant oil to run off, being in common use there for lamp oil. Or, that made at home by the press, which is the best, especially some that is prepared from cold blanched seeds, with the eye taken out. Some chemists are said to take out the colour from the foreign oils, by certain additions, and sell them for English, or, as it is called, cold drawn castor oil. The virosity communicated to the oil by the eyes of the seeds may be got rid of by washing the oil with boiling water, or with weak oil of vitriol. It is soluble in warm spirit of wine, and its adulteration may thus be discovered, if thought necessary; but as all the fat oils have nearly similar qualities, the taste is sufficient for practical purposes. It is purgative in doses of from 1-2 an oz. to 1 1-2 oz. floated on some distilled water, or on wine; or if it does not usually stay well on the stomach, on some tincture of senna; or made into an emulsion with yolk of egg, and a little distilled water, with 20 drops of lavender, and a tea-spoonful of simple syrup; it may also be used in clysters. It is particularly useful where a stimulant would be hurtful; as it operates quickly without disturbing the system; also externally in swelling pains. Contrary to most medicines, on frequent repetition a less dose is sufficient.

Oil of croton.

This oil is extracted from Molucca grains, or purging nuts. In its chemical qualities it agrees with castor oil, but is considerably more active, as a single drop, when the oil is genuine, is a powerful cathartic.

Rape oil.

This is made from rape seed; it dries slowly, makes but a softish soap, fit for ointments: the mucilage it contains may be got rid of in a great measure, by adding half an ounce of oil of vitriol to two pints of the oil.

To purify rape oil.

The following is a simple method of rendering rape oil equal to spermaceti oil, for the purposes of illumination:

Begin by washing the oil with spring water:

which is effected by agitating the oil violently, with a sixth part of the water. This separates the particles of the oil, and mixes those of the water intimately with them. After this operation, it looks like the yolk of eggs beat up. In less than forty-eight hours they seaparate completely, the oil swimming at top, the water, with all feculent and extraneous particles subsiding to the bottom. This may be very much improved, by substituting sea-water in the place of fresh water.

By the process of washing, the oil does not lose an hundredth part. The experiment can at all times be made in a glass decanter, or in a churn, with a cock at the bottom, the water to come up very near to the cock, by which all the oil can be drawn off, after it has deposited its impurities.

Another method.—To 100 parts of oil add 1 1-2 or 2 of concentrated sulphuric acid, and mix the whole well by agitation, when the oil will become turbid, and of a blackish-green colour. In about three quarters of an hour, the colouring matter will begin to collect in clots; the agitation should then be discontinued, and clean water, twice the weight of the sulphuric acid, be added. To mix the water with the oil and acid, a further agitation of half an hour will be requisite. The mass may, afterwards, be left to clarify, for eight days, at the end of which time, three separate fluids will be perceived in the vessel; the upper is the clear oil, the next is the sulphuric acid and water, and the lowest, a black mud or fecula. Let the oil then be separated by a syphon, from the acid and water, and filtrated through cotton or wool; it will be nearly without colour, smell, or taste, and will burn clearly and quietly to the last drop.

To purify vegetable oil.

To 100 pounds of oil, add 25 ounces of roche alum, and mix, dissolved in 9 pounds of boiling water. After stirring it about half an hour, add 15 ounces of nitric acid, still continuing to stir it. Let it stand forty-eight hours, when the fine oil will swim on the surface, and then draw it off. Such oil is used all over the continent, and an equal quantity yields double the light of whale and fish oil, without its offensive odour.

To make pumpkin oil.

From the seeds of the pumpkin, which are generally thrown away, an abundance of an excellent oil may be extracted. When peeled, they yield much more oil than an equal quantity of flax. This oil burns well, gives a lively light, lasts longer than other oils, and emits very little smoke. It has been used on the continent for frying fish, &c. The cake remaining after the extraction of the oil may be given to cattle, who eat it with avidity.

Beech nut oil.

Beech nuts are not only an excellent food for pigs, but they are known to yield an oil fit for common purposes, by the usual methods of extraction.

To extract oil from grape stones.

In Italy an useful oil is drawn from the grape stones. In order to separate the seeds from the husks and refuse matter, the mash is put into a bucket with some water, and worked about with the hands, until the seeds, from their superior weight, have fallen to the bottom of the vessel. They are then to be removed and dried in the sun, or by any other way, as soon as possible; when a sufficient quantity is collected, the whole is to be ground in the same kind of mill that is used for hemp and cole-seed: being then cold drawn, a fine oil is procured, which is scarcely distinguishable from common olive oil. The refuse matter, being scalded in a little hot water, yields a fresh portion of oil, though of an inferior quality, which burns excellently well in a lamp, giving out no unpleasant odour, and very little smoke. By taking the loppings or prunings of the vine, excellent vinegar may be made from the same, and even wine with the aid of sugar.

ANIMAL OILS AND FATS.

Hog's lard.

This is obtained like the rest of the animal fats from the raw lard, by chopping it fine, or rather rolling it out to break the cells in which the fat is lodged, and then melting the fat in a water bath, or other gentle heat, and straining it while warm; some boil them in water, but the fats thus obtained, are apt to grow rank much sooner than when melted by themselves.

Neat's feet, or trotter oil.

Obtained by boiling neat's feet, tripe, &c. in water; it is a coarse animal oil, very emollient, and much used to soften leather.

To purify trotter oil.

Put 1 quart of trotter oil into a vessel containing a quart of rose-water, and set them over a fire till the oil melts and mixes with the rose-water. Stir well with a spoon. When properly combined, take the vessel from the fire, and let it cool. Now take off the oil with a spoon, and add rose-water, as before. When the oil is again separated and cleansed, set it in a cool place. The principal use of trotter oil is for the making of cold cream, in which its qualities exceed those of every other oil.

To prepare oil from the yolks of eggs.

Boil the eggs hard, and after separating the whites break the yolks into two or three pieces, and roast them in a frying pan till the oil begins to exude; then press them with very great force. Fifty eggs yield about 5 ounces of oil. Old eggs yield the greatest quantity.

Another method.—Dilute the raw yolks with a large proportion of water, and add spirit of wine to separate the albumen, when the oil will rise on the top after standing some time, and thus may be separated by a funnel.

To refine spermaceti.

Spermaceti is usually brought home in casks; and, in some cases, has so little oil mixed with it as to obtain the denomination of *head matter*. It is of the consistence of a stiff ointment, of a yellowish colour, and not tenacious. Besides the head matter, there is also a quantity of sperm obtained from the oil by filtration. Indeed, in all good spermaceti lamp oil, which is not transparent, particles of the sperm may be seen floating.

Having the head-matter, or filtered sperm, in order to purify it, first put it into hair cloths, and with an iron plate between each cloth, to the number of half a dozen, or more, submit it to the action of an iron screw-press; and, as the oil does not separate very readily, it will, in general, be necessary to let the cakes of sperm be pressed 3 different times. The third time the cakes will become so dry that they may be broken in small pieces with little trouble, and then put in a furnace containing 1-3d water, and 2-3ds cake. Let the fire be raised sufficiently under the furnace to melt the cake which it will do before the water begins to boil: after which, boil the whole together for about half an hour, taking off, during the boiling, what scum and other extraneous bodies rise to the top; then let the whole be dipped out into a tub, or other coolers. After it is completely cold, take off the cake of spermaceti, which will be on the top of the water, and cut it into pieces. Suppose, for example, that the cake weighs one hundred weight; it will be necessary to have a furnace, or rather a moveable kettle, where the light is thrown in such a way that the process can be observed. Having taken one hundred weight of the unrefined spermaceti, prepared as above, melt it together with about 3 gallons of water. As soon as it begins to boil, add, from time to time, small portions of the following liquor, say half a pint at a time:—Take of the alkaline salt, or pot-ash, 7 pounds. Pour on it 2 gallons of water; let them stand together twenty-four hours, and from the top dip off the ley as wanted adding more water occasionally till the alkali is exhausted. After boiling the spermaceti for about four hours, having during the process taken off the scum as it arose, let the kettle be removed from the fire, and after remaining about a quarter of an hour, dip off the spermaceti into suitable coolers. This process must, in general, be repeated three times. The third time, if the processes have been properly conducted, the spermaceti will be as clear as crystal; and then, after it is cool, the only thing necessary to make it fit for sale, is to cut it into moderately small pieces, when it will break into that flakey appearance which it has in the shops.

To sweeten, purify, and refine Greenland whale and seal oil.

The oil, in its raw state, is filtered through bags, about 41 inches long, with circular mouths, extended by a wooden hoop, about 15 inches in diameter, fixed thereto. These bags are made of jean, lined with flannel; between which jean and flannel powdered charcoal is placed, throughout, to a regular thickness of about half an inch, for the purpose of retaining the glutinous particles of the oil, and straining it from impurities; and the bags are quilted, to prevent the charcoal from becoming thicker in one part than another, and to keep the linings more compact. The oil is pumped into a large funnel, made of tin, annexed to the pump through a perpendicular pipe, and passed from the funnel into another pipe placed over the bags horizontally, from whence it is introduced into them by cocks. The oil runs from the filtering bags into a cistern about 8 feet long by 4 feet broad, and 4 1-2 deep, made of wood, and lined with lead, and containing water at the bottom, about the depth of 5 or 6 inches, in which are dissolved about 6 ounces of blue vitriol, for the purpose of drawing down the glutinous and offensive particles of the oil, which have escaped through the charcoal, and thereby rendering it clean, and free from the unpleasant smell attendant upon the oil in the raw state; and, in order to enable the oil thus to run from the bags, they are hung in a frame or rack, made like a ladder, with the spokes or rails at sufficient distance, to receive the hoop of the bag between two; and such frame or rack is placed in a horizontal position over the cistern. The oil is suffered to run into the cistern until it stands to the depth of about 2 feet in the water, and there to remain for 3 or 4 days, (according to the quality of the oil,) and is then drawn off by a cock, which is fixed in the cistern a little above the water, into a tub or other vessel, when it will be found to be considerably purified and refined, and the oil, after having undergone this operation, may be rendered still more pure, by passing a second or third time through similar bags and cisterns. But the oil, after such second and third process, is drawn off into, and filtered through, additional bags, made of jean, lined with flannel, inclosed in other bags, made of jean, doubled, when the process is complete.

To purify fish oils, and apply the refuse to useful purposes.

The object of this invention is the refining not only of fish oil, but of the oils obtained from all animal substances, and also from expressed vegetables. The mode of performing this is by mixing the oil with an infusion of tannin. Mr. Speers of Dublin, recommends the tannin of oak-bark, but any tannin, whether natural from oak or other barks, or artificial, will answer the purpose. The mode which he prefers is the following: Take equal quantities of oil and soft water; in the water infuse and agitate for a day or two about one-tenth part of its weight of tannin; it is then to be drawn off fine, and the oil and water to be mixed and boiled for some time, and then set by to cool. The tannin will, by means of chemical attraction, unite with the gelatine or mucilage, and, being heavier than oil, will sink below it; but being lighter than water it will swim above it; in other words, this refuse matter will be found between the oil and the water. The oil is first to be drawn off and then the refuse matter may be obtained. This matter may be applied to the formation of cements and stucco; or to the composition of paints and varnishes; or to the composition of an excellent blacking for leather, which will by that means be made waterproof.

Another method.

A method of purifying common fish-oil, and rendering it equal to the best sperm. oil, by the use of animal charcoal, has lately been discovered in Denmark. The description is very incomplete, but mentions that beef bones which have been boiled, are made into animal charcoal in a peculiar way. The charcoal is mixed with the oil, and repeatedly agitated for two months, after which it is filtered through several strata of charcoal, and used as soon as made. The quantity of gas evolved by the bones in the operation is considerable, and is used for lighting the manufactory and adjacent buildings. The residuum is mixed with clay for fuel. The loss in this process is estimated at 15 per cent., and the gain is equal to 40 per cent., leaving a balance in favour of the discovery of 25 per cent.

The peculiar method of making the charcoal, probably consists in not heating the bones too much. It is well known by the animal charcoal makers in London, that if the temperature be raised too high, the charcoal is worth nothing.

Another.

Take a gallon of crude stinking oil, and mix with it a quarter of an ounce of powdered chalk, a quarter of an ounce of lime, slaked in the air, and half a pint of water; stir them together; and when they have stood some hours, add a pint of water, and two ounces of pearl-ashes, and place the mixture over a fire that will just keep it simmering, till the oil appears of a light amber colour, and has lost all smell, except a hot, greasy, soap-like scent. Then superadd half a pint of water in which one ounce of salt has been dissolved, and having boiled it half an hour, pour the mixture into a proper vessel, and let it stand for some days, till the oil and water separate.

If this operation be repeated several times, diminishing each time the quantity of ingredients one half, the oil may be brought to a very light colour, and be rendered equally sweet with the common spermaceti oil.

Oil purified in this manner is found to burn much better, and to answer better the purposes of the woollen manufacture. If an oil be wanted thicker and more unctuous, this may be rendered so by the addition of tallow or fat.

To prepare oils for the manufacture of hard soap.

Let the oil be ground in a mill, along with a quantity of fine new-slaked lime, till it becomes of the consistence of thick cream: this being done, let an iron pan be filled one-eighth full of this mixture, to which is to be added an equal quantity of unprepared oil, the whole being well stirred together. A brisk fire is now to be made under the pan, the contents of which will soon swell to the top, and afterwards subside; the fire and stirring must, however, be still kept up, till the mixture begins to swell and boil a second time, emitting thick clouds of steam; another portion of oil is now to be added and stirred briskly in, till this ebullition is suppressed; the lime being now united to the oil, the mass when cold, will be of the consistence of wax. To make hard soap with the oil thus prepared, let tallow, rosin, grease, or unprepared oil, be added in the proportion of one half, and melted, to which add a ley, made of mineral alkali. When a perfect combination has taken place, by boiling and stirring, let the soap be taken out, and cleansed into frames: from which, there will be, as usual, a small discharge of impure ley, after which the soap is ready for use.

CULINARY ARTS.

COOKERY.

To boil meats, &c.

This most simple of culinary processes is not often performed in perfection, though it does not require so much nicety and attendance as roasting; to skim the pot well, and to keep it moderately boiling, and to know how long the joint requires, comprehends the most useful point of this branch of cookery. The cook must take especial care that the water really boils all the while she is cooking, or she will be deceived in the time. An adept cook will manage with much less fire for boiling than she uses for roasting, and to last all the time without much mending. When the water is coming to a boil there will always rise from the cleanest meat a scum to the top, this must be carefully taken off as soon as it appears, for on this depends the good appearance of a boiled dinner. When you have skimmed it well, put in a little cold water, which will throw up the rest of it. If let alone, it soon boils down and sticks to the meat, which, instead of looking white and healthful, will have a coarse and uninviting appearance.

Many cooks put in milk to make what they boil look white, but this does more harm than good; others wrap the meat in a cloth; but if it is well skimmed it will have a much more delicate appearance than when it is muffled up.

Put the meat into cold water in the proportion of about a quart to every pound of meat; it should remain covered during the whole process of boiling, but only just so. Water beyond what is absolutely necessary renders the meat less savoury and weakens the broth.

The water should be gradually heated according to the thickness, &c. of the article boiled; for instance, a leg of mutton of 10 lbs. weight should be placed over a moderate fire which will gradually heat the water without causing it to boil, for about forty minutes. If the water boils much sooner, the meat will be hardened, and shrink up as if it were scorched. Reckon the time from its first coming to a boil; the slower it boils the tenderer, the plumper, and whiter it will be. For those who choose their food thoroughly cooked, twenty minutes to a pound will not be found too much for *gentle simmering* by the side of the fire. Fresh killed meat will take much longer time boiling than that which has been kept till what the butchers call ripe; if it be fresh killed it will be tough and hard if stewed ever so long, and ever so gently. The size of the boiling pots should be adapted to what they are to contain; in small families we recommend block-tin sauce-pans, &c. as lightest and safest, taking care that the covers fit close, otherwise the introduction of smoke may be the means of giving the meat a bad taste. Beef and mutton a little underdone is not a great fault, but lamb, pork, and veal are uneatable and truly unwholesome, if not thoroughly boiled. Take care of the liquor in which poultry or meat has been boiled, as an addition of peas, herbs, &c. will convert it into a nourishing soup.

To bake meats, &c.

This is one of the cheapest and most convenient ways of dressing a dinner in small families, and although the general superiority of roasting must be allowed, still certain joints and dishes, such as legs and loins of pork, legs and shoulders of mutton and fillets of veal, will bake to great advantage, if the meat be good. Besides those joints above-mentioned, we shall enumerate a few baked dishes which may be particularly recommended.

A pig when sent to the baker prepared for baking, should have its ears and tail covered with buttered paper, and a bit of butter tied up in a piece of linen to baste the back with, otherwise it will be apt to blister. If well baked it is considered equal to a roasted one.

A *goose* prepared the same as for roasting, or a *duck* placed upon a stand, and turned, as soon as one side is done, upon the other, are equally good.

A *buttock of beef*, prepared as follows, is particularly fine; after it has been put in salt about a week, let it be well washed and put into a brown earthen pan with a pint of water; cover the pan tight over with 2 or 3 thicknesses of cap paper, and give it four or five hours in a moderately heated oven.

A *ham*, if not too old, put in soak for an hour, taken out and baked in a moderately heated oven, cuts fuller of gravy, and of a finer flavour, than a boiled one.

Cod fish, haddock, and mackarel, should have a dust of flour and some bits of butter spread over them. Eels when large and stuffed, herrings and sprats, are put in a brown pan, with vinegar and a little spice, and tied over with paper.

A *hare*, prepared the same as for roasting, with a few bits of butter and a little milk, put into the dish and basted several times, will be found nearly equal to roasting: in the same manner legs and shins of beef will be equally good with proper vegetable seasoning.

To roast meats, &c.

The first thing requisite for roasting is to have a strong steady fire, or a clear brisk one, according to the size and weight of the joint that is put down to the spit. A cook who does not attend to this, will prove herself totally incompetent to roast victuals properly. All roasting should be done open to the air, to ventilate the meat from its gross fumes, otherwise it becomes baked instead of roasted. The joint should be put down at such a distance from the fire as to imbibe the heat rather quickly, otherwise its plumpness and good quality will be gradually dried up, and it will turn shrivelly, and look meagre. When the meat is first put down, it is necessary to see that it balances well on the spit, otherwise the process of cooking will be very troublesome. When it is warm, begin to baste it well, which prevents the nutritive juices escaping; and, if required, additional dripping must be used for that purpose.

As to sprinkling with salt while roasting, most able cooks dispense with it, as the penetrating particles of the salt have a tendency to draw out the animal juices; however, a little salt thrown on when first laid down, is sometimes necessary, with strong meats. When the smoke draws towards the fire, and the dropping of the clear gravy begins, it is a sure sign that the joint is nearly done. Then take off the paper, baste well, and dredge it with flour, which brings on that beautiful brownness which makes roasted meats look so inviting.

With regard to the time necessary for roasting various meats, it will vary according to the different sorts, the time it has been kept, and the temperature of the weather. In summer, 20 minutes may be reckoned equal to half an hour in winter. A good screen to keep off the chilling currents of air, is essentially useful. The old housewife's rule is to allow rather more than a quarter of an hour to each pound, and in most instances it proves practically correct.

In roasting *mutton* or *lamb*, the loin, the chine, and the saddle, must have the skin raised, and skewered on; and when nearly done, take off this skin, and baste and flour to froth it up.

Veal requires roasting brown, and if a fillet or loin, be sure to paper the fat, that as little of it may be lost as possible. When nearly done, baste it with butter and dredge with flour.

Pork should be well done. When roasting a loin, cut the skin across with a sharp knife, otherwise the crackling is very awkward to manage. Stuff the knuckle part with sage and onion, and skewer it up. Put a little drawn gravy in the dish, and serve it up with apple sauce in a turene. A spare rib should be basted with a little butter, a little dust of flour, and some sage and onions shred small. Apple sauce is the only one which suits this dish.

Wild fowls require a clear brisk fire, and should be roasted till they are of a light brown, but not too much; yet it is a common fault to roast them till the gravy runs out, thereby losing their fine flavour.

Tame fowls require more roasting, as the heat is longer in penetrating: they should be often basted, in order to keep up a strong froth, and to improve their plumpness.

Pigs and *geese* should be thoroughly roasted before a good fire, and turned quickly.

Hares and *rabbits* require time and care, especially to have the ends sufficiently done, and to remedy that raw discolouring at the neck, &c. which proves often so objectionable at table.

To regulate time in cookery.

Mutton.

A leg of 8 lbs. will require two hours and a half. A chine or saddle of 10 or 11 lbs. two hours and a half. A shoulder of 7 lbs. one hour and a half. A loin of 7 lbs. one hour and three quarters. A neck and breast, about the same time as a loin.

Beef.

The *surloin* of 15 lbs. from three hours and three-quarters to four hours. *Ribs of beef*, from 15 to 20 lbs. will take three hours to three hours and a half.

Veal.

A *fillet*, from 12 to 16 lbs. will take from four to five hours, at a good fire. A *loin*, upon the average, will take three hours. A *shoulder*, from three hours to three hours and a half. A *neck* two hours. A *breast*, from an hour and a half to two hours.

Lamb.

Hind-quarter of 8 lbs. will take from an hour and three-quarters, to two hours. *Fore-quarter* of 10 lbs. about two hours. *Leg* of 5 lbs. from an hour and a quarter to an hour and a half. *Shoulder*, or *breast*, with a quick fire, an hour.

Pork.

A *leg* of 8 lbs. will require about three hours. *Griskin*, an hour and a half. A *spare-rib* of 8 or 9 lbs. will take from two hours and a half to three hours, to roast it thoroughly. A *bald spare-rib* of 8 lbs. an hour and a quarter. A *loin* of 5 lbs. if very fat, from two hours to two hours and a half. A *sucking pig*, of three weeks old, about an hour and a half.

Poultry.

A very large *turkey* will require about three hours; one of 10 lbs. two hours; a small one an hour and a half.

A full-grown *fowl*, an hour and a quarter; a moderate sized one, an hour.

A *pullet*, from half an hour to 40 minutes.

A *goose*, full grown, from an hour and a half to two hours.

A *green goose*, 40 minutes.

A *duck*, full size, from 30 to 50 minutes.

Venison.

A *buck haunch* which weighs from 20 to 25 lbs. will take about four hours and a half roasting: one from 12 to 18 lbs. will take three hours and a quarter.

To broil.

This culinary branch is very confined, but excellent as respects chops or steaks; to cook which in perfection, the fire should be clear and brisk, and the gridiron set on it slanting, to prevent the fat dropping in it. In addition, quick and frequent turning will ensure good flavour in the taste of the article cooked.

To fry meats, &c.

Be always careful to keep the frying-pan clean, and see that it is properly tinned. When frying any sort of fish, first dry them in a cloth, and then flour them. Put into the pan plenty of dripping, or hog's lard, and let it be boiling hot before putting in the fish. Butter is not so good for the purpose, as it is apt to burn and blacken, and make them soft. When they are fried, put them in a dish, or hair sieve, to drain, before they are sent to table. Olive oil is the best article for frying, but it is very expensive, and bad oil spoils every thing that is dressed with it. Steaks and chops should be put in when the liquor is hot, and done quickly, of a light brown and turned often. Sausages should be done gradually, which will prevent their bursting.

To make a savoury dish of veal.

Cut some large scollops from a leg of veal, spread them on a dresser, dip them in rich egg batter; season them with cloves, mace, nutmeg, and pepper beaten fine; make force-meat with some of the veal, some beef-suet, oysters chopped, sweet herbs shred fine; strew all these over the collops, roll and tie them up, put them on skewers and roast them. To the rest of the force meat, add two raw eggs, roll them in balls and fry them. Put them into the dish with the meat when roasted: and make the sauce with strong broth, an anchovy or a shalot, a little white wine and some spice. Let it stew, and thicken it with a piece of butter rolled in flour. Pour the sauce into the dish, lay the meat in with the force-meat balls, and garnish with lemon.

To dress a fowl with the flavour of game.

Cut the meat of a long-kept rabbit into thin slices; lay them on a dish, and season with pepper and salt, chopped parsley, chibol, shallots, and a little fine oil; split a fowl at the back, bone it all to the legs and wings, stuff it with this, then sew it up, and give it its natural form; brace it with slices of veal and ham, covered over with slices of bacon; soak it about a quarter of an hour, then add a glass of white wine, a little broth, a faggot, pepper and salt; when done, sift and skim the sauce, add a little cullis, and serve up the fowl.

To make artificial eggs and bacon.

Make clear blancmange in a white dish, cut it into rounds with the top of a tea-cup, and lay them on the dish on which it is to be served; make yellow Dutch flummery, run it into a small tea-cup, in the form of the yolk of an egg, and place one on each round of the blancmange. Cut six straight pieces of blancmange, on which lay three streaks of preserved damsons, and serve all on the same dish.

To make veal cake.

Take the best end of a breast of veal, bone and cut it in three pieces: take the yolks out of eight eggs boiled hard, and slice the whites, the yolks to be cut through the middle, two anchovies, a good deal of parsley chopped fine, and some lean ham cut into thin slices; all these to be well seasoned separately with Cayenne, black pepper, salt, and a little nutmeg; have ready a mug, the size of the intended cake, with a little butter rubbed on it, put a layer of veal on the bottom, then a layer of egg and parsley, and ham to fancy; repeat it till all is in, lay the bones on the top, and let it be baked three or four hours; then take off the bones, and press down the cake till quite cold. The mug must be dipped into warm water, and the cake turned out with great care, that the jelly may not be broken which hangs round it.

Portuguese method of deressing a loin of pork.

Steep it during an entire week in red wine, (claret in preference) with a strong infusion of garlic and a little spice; then sprinkle it with fine herbs, envelope it in bay leaves, and bake it along with Seville oranges *piquées de girofle.*

To make dry devils.

These are usually composed of the broiled legs and gizzards of poultry, fish bones, or biscuits, *sauce piquante.* Mix equal parts of fine salt, Cayenne pepper, and currie powder, with double the quantity of powder of truffles: dissect a brace of woodcocks rather under roasted, split the heads, subdivide the wings, &c. &c. and powder the whole gently over with the mixture: crush the trail and brains along with the yolk of a hard boiled egg, a small portion of pounded mace, the grated peel of half a lemon, and half a spoonful of soy, until the ingredients be brought to the consistence of a fine paste; then add a table spoonful of catsup, a full wine glass of Madeira, and the juice of two Seville oranges; throw the sauce, along with the birds, into a stew-dish, to be heated with spirit of wine—cover close up—light the lamp—and keep gently simmering, and occasionally stirring, until the flesh has imbibed the greater part of the liquid. When it is completely saturated, pour in a small quantity of salad oil, stir all once more well together, put out the light, and serve it round instantly.

To make an olio.

Boil in a broth pot, a fowl, a partridge, a small leg of mutton, five or six pounds of large slices of beef, and a knuckle of veal; soak all these without broth for some time, turn the meat to give it a good colour, and add boiling water: when it has boiled about an hour, add all sorts of best broth herbs; this broth, when good, is of a fine brown colour.

To pot a leg of beef.

Boil a leg of beef till the meat will come off the bone easily; then mix it with a cow heel, previously cut into thin pieces, and season the whole with salt and spice: add a little of the liquor in which the leg of beef was boiled, put it into a cheese-vat, or cullender, or some other vessel that will let the liquor run off; place a very heavy weight over it, and it will be ready for use in a day or two. It may be kept in souse made of bran boiled in water, with the addition of a little vinegar.

To pot beef.

Cut it small, add to it some melted butter, 2 anchovies boned and washed, and a little of the best pepper, beat fine. Put them into a marble mortar, and beat them well together till the meat is yellow; put it into pots and cover with clarified butter.

To pot eels.

Cut them in pieces about four inches long, season with a little beaten mace, nutmeg, pepper, salt, and a little sal prunella beaten fine. Lay them in a pan and pour as much clarified butter over as will cover it. Bake half an hour in a quick oven, till properly done. Then lay them on a coarse cloth to drain; when quite cold season them again the same way. Then take off the butter they were baked in clear from the gravy of the fish, and set them in a dish before the fire.

When melted, pour the butter over them and put by for use.

To make Bologna sausages.

Take a pound of beef suet, a pound of pork, a pound of bacon fat and lean, and a pound of beef and veal. Cut them very small. Take a handful of sage leaves chopped fine, with a few sweet herbs. Season pretty high with pepper and salt, take a large well cleaned gut and fill it. Set on a saucepan of water, and when it boils, put it in, first pricking it to prevent its bursting. Boil it one hour.

To make Oxford sausages.

Take 1 lb. of young pork, fat and clean, without skin or gristle, 1 lb. of beef suet, chopped fine together; put in 1-2 lb. of grated bread, half the peel of a lemon shred, a nutmeg grated, 6 sage leaves chopped fine, a teaspoonful of pepper, and 2 of salt, some thyme, savory, and marjoram, shred fine. Mix well together and put it close down in a pan till used. Roll them out the size of common sausages, and fry them in fresh butter of a fine brown, or broil them over a clear fire, and send them to table hot.

To make Epping sausages.

Take 6 pounds of young pork, quite free from skin, gristle, or fat; cut it small, and beat it fine in a mortar. Chop 6 pounds of beef suet very fine, shred a handful of sage leaves fine, spread the meat on a clean dresser, and shake the sage over it. Shred the rind of a lemon very fine, and throw it with sweet herbs on the meat. Grate two nutmegs, to which put a spoonful of pepper, and a large spoonful of salt. Throw the suet over, and mix all well together. Put it down close in the pot, and when used, roll it up with as much egg as will make it smooth.

To make Savaloy's.

Take 3 pounds of young pork free from bone and skin; salt it with an ounce of saltpetre, and a pound of common salt for two days; chop it fine; put in 3 teaspoonsful of pepper; a dozen sage leaves chopped fine, and a pound of grated bread; mix it well, fill the the guts, and bake them half an hour in a slack oven: they are good either hot or cold.

To make beef a la mode.

Take 11 pounds of the mouse buttock, or clod of beef, cut it into pieces of 3 or 4 ounces each; put 2 or three large onions, and 2 ounces of beef dripping into a large deep stew pan; as soon as it is quite hot, flour the meat, and put it into the stew pan; fill it sufficiently to cover the contents with water, and stir it continually with a wooden spoon; when it has been on a quarter of an hour, dredge it with flour, and keep doing so till it has been stirred, as much as will thicken it; then cover it with boiling water. Skim it when it boils, and put in 1 drachm of black ground pepper, 2 of allspice, and 4 bay leaves; set the pan by the side of the fire to stew slowly about four hours. This is at once a savoury and economical dish.

To make a French stew of green peas and bacon.

Cut about 1-4 of lb. of fresh bacon into thin slices; soak it on the fire in a stew-pan until it is almost done; then put about a quart of peas to it, a good bit of butter, a faggot of parsley, and 2 spoonsful of catsup: simmer on a slow fire and reduce the sauce: take out the faggot and serve the rest together.

To make mock brawn.

Take the head and belly piece of a young porker, well saltpetred; split the head and boil it; take out the bones and cut it to pieces; then take four ox feet boiled tender, and cut them in thin pieces; lay them in the belly piece with the head cut small; roll it up tight with sheet tin, and boil it four or five hours. When it comes out set it up on one end, put a trencher on it within the tin, press it down with a large weight, and let it stand all night. The next morning take it out of the tin and bind it with a fillet, put it into cold salt and water, and it will be fit for use; it will keep a long time, if fresh salt and water are put into it every four days.

To make Dr. Kitchener's pudding.

Beat up the yolks and whites of three eggs, strain them through a sieve, and gradually add to them about a quarter of a pint of milk. Stir these well together; mix in a mortar, 2 oz. of moist sugar, and as much grated nutmeg as will lie on a sixpence; stir these into the eggs and milk.—Then put in 4 oz. of flour, and beat it into a smooth batter; stir in, gradually, 8 oz. of very fine chopped suet, and 3 oz. of bread crumbs—mix all thoroughly together, at least half an hour before putting the pudding into the pot. Put it into an earthenware mould that is well buttered, and tie a pudding cloth over it.

Nottingham pudding.

Peel six good apples; take out the cores with the point of a small knife, but be sure to leave the apples whole; fill up where the core was taken from with sugar, place them in a pie dish, and pour over them a nice light batter, prepared as for batter pudding, and bake them an hour in a moderate oven.

To make a fasting day's dish.

Boil eggs very hard, and cut a little from the thick ends. Fry them in a pan, and take care to keep them continually in motion; then place them in the dish, pour over them some good fish or herb gravy, and garnish with lemon.

To drees a military omelette.

Make a ragout of stewed sorrel, with a little parmesan cheese, rasped and mixed with bread crumbs; make two omelettes, put this ragout between, and garnish the dish round with fried bread, standing up like a paste border; which may be done by dipping the edge of each bit in whites of eggs to make them stick; pour a little melted butter over it, and strew bread crumbs and parmesan cheese as before; give colour in the oven, or with a hot shovel.

To make an onion omelette.

Fry two or three sliced onions in butter till they are quite done, add two yolks of eggs, and a little chopped parsley; make two small omelettes without salt, put the onions and a few fillets of anchovies upon them, and roll them lengthways; have some pieces of bread cut like toast and fried in butter; cut the omelettes according to the size of the bread, and place them thereon; pour a little melted butter over, and strew them with bread crumbs and rasped parmesan cheese: give them a good colour in the oven, or with a salamander; serve what sauce you please.

French method.—The eggs should be beaten with a spoon, white and yolk together; and a small quantity of parsley and young onions, minced, should be stirred among the butter, before it is poured into the frying-pan.

Another omelette.—The eggs being beaten, are to be seasoned with salt and pepper, and then fried in butter made boiling hot; when done, the gravy is to be poured on, and the whole stewed with chives and parsley shred small; when one side is fried enough, it is to be turned on the other.

To make Yorkshire pudding.

This nice dish is usually baked under meat, and is thus made. Beat four large spoonsful of flour, eggs, and a little salt for fifteen minutes. Then put to them, three pints of milk, and mix them well together. Then butter a dripping-pan, and set it under beef, mutton, or veal, while roasting. When it is brown, cut it into square pieces, and turn it over; and when the under side is browned also, send it to the table on a dish.

Dutch pudding.

Cut a round piece out of the bottom of a Dutch loaf, and put that and the piece that was cut out into a quart of cold new milk, in the evening, and let it stand all night. If the milk is all soaked up by the morning, add some more. Put the piece in the bottom again, tie the loaf up in a cloth, and boil it an hour. Eat it with sugar, or with melted butter, white wine, and sugar sauce.

To make a dish of frumenty.

Boil an approved quantity of wheat; when soft, pour off the water, and keep it for use as it is wanted. The method of using it is, to put milk to make it of an agreeable thickness; then warming it, adding some sugar and nutmeg.

To make a Windsor pudding.

Shred half a pound of suet very fine, grate into it half a pound of French roll, a little nutmeg, and the rind of a lemon. Add to these, half a pound of chopped apple, half a pound of currants, clean washed and dried, half a pound of jar raisins, stoned and chopped, a glass of rich sweet wine, and five eggs beaten with a little salt. Mix all thoroughly together, and boil it in a basin or mould, for three hours. Sift fine sugar over it when sent to table, and pour white wine sauce into the dish.

A Cheshire pudding.

Make a crust as for a fruit pudding, roll it out to fourteen or fifteen inches in length, and eight or nine in width; spread with raspberry jam or any other preserve of a similar kind, and roll it up, in the manner of a collared eel. Wrap a cloth round it two or three times, and tie it tight at each end. Two hours and a quarter will boil it.

To make a plain pudding.

Weigh three quarters of a pound of any odd scraps of bread, whether crust or crumb, cut them small, and pour on them a pint and a half of boiling water, to soak them well. Let it stand till the water is cool, then press it out, and mash the bread smooth with the back of a spoon. Add to it, a tea-spoonful of beaten ginger, some moist sugar, and three quarters of a lb. of currants. Mix all well together, and lay it in a pan well buttered. Flatten it down with a spoon, and lay some pieces of butter on the top. Bake it in a moderate oven, and serve it hot. When cold, it will turn out of the pan, and eat like good plain cheese cakes.

A Patna rice pudding.

Wash a quarter of a pound of whole rice, dry it in a cloth and beat it to a powder. Set it upon the fire with a pint and a half of new milk, till it thickens, but do not let it boil; pour it out, and let it stand to cool. Add to it, some cinnamon, nutmeg, and mace, pounded, sugar to the taste, half a pound of suet shred very small, and eight eggs well beaten with some salt. Put to it, either half a pound of currants, clean washed and dried by the fire, or some candied lemon, citron, or orange peel. Bake it half an hour with a puff crust under it.

A baked potatoe pudding.

Mix twelve ounces of potatoes boiled, skimmed, and mashed, 1 oz. of suet, quarter of a pint of milk, and 1 oz. of cheese grated fine; add as much boiling water as is necessary to produce a due consistence, and bake it in an earthen pan.

To make raspberry dumplings.

Make a puff paste, and roll it out. Spread raspberry jam, and make it into dumplings. Boil them an hour; pour melted butter into a dish, and strew grated sugar over it.

To make raspberry and cream tarts.

Roll out thin puff paste, lay it in a patty-pan; put in raspberries, and stew fine sugar over them. Put on a lid, and when baked, cut it open, and put in half a pint of cream, the yolks of two eggs well beaten, and a little sugar.

To make marrow pudding.

Grate a penny loaf into crumbs, pour on them a pint of boiling hot cream. Cut very thin a pound of beef marrow, beat four eggs well, and then put in a glass of brandy, with sugar and nutmeg to taste. Mix them all well together, and either boil or bake it, for three quarters of an hour will do it. Cut two ounces of citron very thin, and, when served up, stick them all over it.

To make Oldbury pudding.

Beat four eggs very well, have ready a pint basin floured and buttered, pour in the eggs, and fill it up with new milk previously boiled, and with two laurel leaves, and when cold, beat them together; put a white paper over the basin, cover with a cloth, and boil it 20 minutes. Send it up with wine and butter sauce.

Quince pudding.

Scald the quices tender, pare them thin, scrape off the pulp, mix with sugar very sweet, and add a little ginger and cinnamon. To a pint of cream put three or four yolks of eggs, and stir it into the quinces till they are of a good thickness. Butter the dish, pour it in, and bake it.

Tansy pudding.

Blanch and pound a quarter of a pound of Jordon almonds; put them into a stew pan, add a gill of the syrup of roses, the crumb of a French roll, some grated nutmeg, half a glass of brandy, two table-spoonsful of tansy juice, 3 oz. of fresh butter, and some slices of citron. Pour over it a pint and a half of boiling cream or milk, sweeten, and when cold, mix it; add the juice of a lemon, and 8 eggs beaten. It may be either boiled or baked.

Lemon pudding.

Cut off the rind of 3 lemons, boil them tender, pound them in a mortar, and mix them with a quarter of a pound of Naples biscuits, boiled up in a quart of milk or cream; beat up 12 yolks and 6 whites of eggs. Melt a quarter of a pound of fresh butter, and put in half a pound of sugar, and a little orange flower water. Mix all well together, stir it over the fire, till thick, and squeeze in the juice of half a lemon. Put puff paste round the dish, then pour in the pudding: cut candied sweet meats, and strew over and bake it for 3-4 of an hour.

To make a perigord pie.

Take half a dozen partridges, and dispose of their legs in the same manner as is done with chickens, when intended to be boiled. Season them well with pepper, salt, a small quantity of cloves and mace beaten fine. Cut two pounds of lean veal, and one pound of fat bacon into small bits, and put them into a stew-pan with half a pound of butter, together with some shalots, parsley, thyme, all chopped together. Stew these till the meat appear sufficiently tender. Then season it in the same manner as directed for the partridges. Strain and pound the meat in a mortar till it is perfectly smooth, then mix the pulp in some of the liquor in which it has been stewed. The pie-crust being raised, and ready to receive the partridges, put them in with the above-mentioned force-meat over them, and over that lay some thin slices of bacon. Cover the pie with a thick lid, and be sure to close it well at the sides, to prevent the gravy from boiling out at the place where the joining is made, which would occasion the partridges to eat dry. This sized pie will require 3 hours baking, but be careful not to put it in a fierce heated oven. A pound of fresh truffles will add considerably to the merits of this excellent pie.

To make a puff paste.

Take a quarter of a peck of flour, and rub it into a pound of butter very fine. Make it up into a light paste with cold water just stiff enough to work it up. Then lay it out about as thick as a crown piece; put a layer of butter all over, then sprinkle on a little flour, double it up, and roll it out again. Double and roll it with layers of butter three times, and it will be fit for use.

To make a short crust.

Put six ounces of butter to eight ounces of flour, and work them well together; then mix it up with as little water as possible, so as to have it a stiffish paste; then roll it out thin for use.

To make a good paste for large pies.

Put to a peck of flour three eggs, then put in half a pound of suet, a pound and a half of butter and suet, and as much of the liquor as will make it a good light crust. Work it up well and roll it out.

Another method.—Take a peck of flour, and six pounds of butter, boiled in a gallon of water, then skim it off into the flour, with as little of the liquor as possible. Work it up well into a paste, pull it into pieces till cold, then make it into the desired form.

To make paste for tarts.

Put an ounce of loaf sugar, beat and sifted, to one pound of fine flour. Make it into a stiff paste, with a gill of boiling cream, and three ounces of butter. Work it well, and roll it very thin.

To keep potatoes for sea provisions.

Slice them and bake them slowly and they will keep and form good flour for years.

To use herrings economically.

The best method of using salted herrings with potatoes is, to parboil the potatoes without their skins, then boil them with the herrings thoroughly, and put them on a dish, when they will form a most excellent flavoured meal.

To make a sack posset.

Beat up the yolks and whites of 15 eggs, strain them, and then put three quarters of a pound of white sugar in a pint of Canary, and mix it with the eggs in a basin. Set it over a chafing dish of coals, and keep continually stirring it until it is quite hot. Next grate some nutmeg in a quart of milk, boil it, and then pour it into the eggs and wine; while pouring, hold the hand very high, and let another person keep stirring the posset, which renders it smooth, and full bodied to the taste.

Another method.—Take four Naples biscuits, and crumble them into a quart of new milk, when it boils a little, grate in some nutmeg, and sweeten it to taste: next pour in half a pint of sack. Keep stirring it, when it will be fit for table.

To make ale posset.

Take a small piece of white bread, put it into a pint of milk, and set it over the fire. Then put some nutmeg and sugar into a pint of ale, warm it, and when the milk boils, pour it upon the ale. Let it stand a few minutes to clear.

To make green gooseberry cheese.

Take 6 lbs. of unripe rough gooseberries, cut off the blossoms and stems, and put them in cold water for an hour or two; then take them out, bruise them in a marble mortar, and put them into a brass pan or kettle, over a clear fire, stirring them till tender: then add 4 1-2 lbs. of lump sugar pounded, and boil it till very thick, and of a fine green colour, stirring it all the time.

To steam potatoes.

Put them clean washed, with their skins on, into a steam saucepan, and let the water under them be about half boiling, let them continue to boil rather quickly, until they are done; if the water once relaxes from its heat, the goodness of the potatoe is sure to be affected, and to become soddened, let the quality be ever so good. A too precipitate boiling is equally disadvantageous; as the nigher parts to the surface of the root begin to crack and open, while the centre part continues unheated and undecomposed.

To make potatoe bread.

Boil the potatoes not quite so soft as common, then dry them a short time on the fire, peel them while hot, and pound them as fine as possible, next put a small quantity of pearl ash to a new yeast; whilst it is working briskly, add as much rye-meal, or flour, as can be worked in. Mix the whole well together, but do not add any water to it. After the dough is thus prepared, let it stand an hour and a half or two hours before it is put into the oven; observe it will not require so long baking as regular flour bread.

Another method.—Take 5 lbs. of dried potatoe starch, and 5 lbs. of the pulp; dissolve a suitable quantity of leaven or yeast in warm water, the mixture being exactly made the night before; let it be all night in a kneading trough, well covered and kept warm until the next day—this is the second leaven—then add 5 lbs. more of starch, and the same quantity of pulp, and knead it well; the water must be in the proportion of a fifth part, that is, upon 20 lbs. of paste there must be 5 lbs. of water, which is to be used as hot as possible.

To use frosted potatoes.

If much frozen lay them in cold water, and to each peck of potatoes take a 1-4 of oz. of salt-petre dissolved in water, which mix with the fluid in which they are boiled, if the potatoes are so frozen as to be quite unfit for nourishment they will make starch, and will yield more flour than if unfermented by the icy power. This flour, with an equal quantity of wheat flour, some butter, sugar, a little balm, and a few currants, makes excellent bread for tea. If formed into small cakes, and put into a slow oven, it will keep a month.

SOUPS, &c.

To make a tureen of soup Flemish fashion.

Scald half a dozen of turkey pinions, four sheep's rumps, and 1-2 a pound or more of pickled pork; then tie up each sort together, scald also a good savoy cut into quarters and tied; put them altogether into a pan with good broth, a faggot of sweet herbs, parsley, green shalots, 3 cloves, pepper and salt; boil slowly; when done, drain the meat; put it into the tureen, and serve a good gravy sauce with it.

To make a tureen of hodge podge of different sorts.

Take either a brisket of beef, mutton, steaks, whole pigeons, rabbits cut in quarters, veal, or poultry; boil a long time over a slow fire in a short liquid, with some onions, carrots, parsnips, turnips, celery, a faggot of parsley, green shalots, 1 clove of garlick, 4 of spices, a laurel leaf, thyme, a little basil, large thick sausages, and thin broth or water; when done, drain the meat, and place it upon a dish intermixed with roots, sift and skim the sauce, reduce some of it to a glaze, if desired; glaze the meat with it, then add some gravy on the same stew-pan and broth sufficient to make sauce enough with pepper and salt: sift it in a sieve, and serve upon the meat. If brisket of beef is used, let it be half done before putting in the roots, which should be scalded first, as it makes the broth more palatable.

To make portable soup.

Cut into small pieces 3 large legs of veal, 1 of beef, and the lean part of a ham: lay the meat in a large cauldron, with a quarter of a pound of butter at the bottom, 4 ounces of anchovies, and 2 ounces of mace. Cut small 6 heads of clean washed celery, freed from green leaves, and put them into the cauldron, with 3 large carrots cut thin. Cover all close, and set it on a moderate fire. When the gravy begins to draw, keep taking it off till it is all extracted. Then cover the meat with water, let it boil gently for four hours, then strain it through a hair sieve into a clean pan, till it is reduced to one-third. Strain the gravy drawn from the meat into a pan, and let it boil gently, until it be of a glutinous consistence. Take care and skim off all the fat as it rises. Watch it when it is nearly done, that it does not burn; next season it with Cayenne pepper, and pour it on flat earthen dishes, a quarter of an inch thick. Let it stand till the next day, and then cut it out by round tins larger than a crown piece. Set the cakes in dishes in the sun to dry, and turn them often. When fully dried, put them into a tin box with a piece of clean white paper between each, and keep them in a dry place. If made in frosty weather it will soon become solid. This kind of soup is exceedingly convenient for private families, for by putting one of the cakes in a saucepan with about a pint of water, and a little salt, a bason of good broth may be made in a few minutes. It will likewise make an excellent gravy for roast turkeys, fowls, and game.

To make curry.

Take the skin off two chickens; carve wash and dry them; put them in a stew pan with a teacupful of water, salt, and a few onions, and stew them with a few green peas, or the egg plant, till tender; then take a lump of butter, the size of a pigeon's egg, a little mace, Cayenne pepper to taste, a teaspoonful each of fresh turmeric and cardamoms, pounded with a shalot in a marble mortar; roll these ingredients with a little flour in the butter, and dissolve them in the stew. If the curry is to be brown, it must be fried a little before the curry-ball is added to the gravy.

To make soup maigre.

Take of veal, beef cut into small pieces, and scrag of mutton, 1 lb. each; put them into a saucepan with 2 quarts of water; put into a clean cloth 1 oz. of barley, an onion, a small bundle of sweet herbs, 3 or 4 heads of celery cut small, a little mace, 2 or 3 cloves, 3 turnips pared and cut in two, a large carrot cut into small pieces, and a young lettuce. Cover the pot close, and let it stew very gently for six hours. Then take out the spice, sweet herbs, and onion, and pour all into a soup dish, seasoned with salt.

To make mock turtle soup.

Scald a calf's head with the skin on, and take off the horny part, which cut into two-inch square pieces: clean and dry them well in a cloth, and put them into a stew pan, with 4 quarts of water made as follows:—Take 6 or 7 lbs. of beef, a calf's foot, a shank of ham, an onion, 2 carrots, a turnip, a head of celery, some cloves, and whole pepper, a bunch of sweet herbs, a little lemon peel, and a few truffles. Put these into 8 quarts of water, and stew them gently till the liquid is reduced one half; then strain it off, and put it into the stewpan with the horny parts of the calf's head. Add some knotted marjoram, savory, thyme, parsley chopped small, with some cloves and mace pounded, a little Cayenne pepper, some green onions, a shalot cut fine, a few chopped mushrooms, and half a pint of madeira wine. Stew these gently till the soup is reduced to two quarts, then heat a little broth; mix some flour, smoothing it with the yolks of 2 eggs, and stir it over a gentle fire till it is near boiling. Add this to the soup; keep stirring as you pour it in, and continue stewing for another hour. When done, squeeze in the juice of half a lemon, half an orange, and throw in some boiled force-meat balls. Serve it up in a tureen hot. This soup is deliciously gratifying and nutritive.

To make asparagus soup.

Put a small broiled bone to 1 1-2 pints of peas, and water in proportion, a root of celery, a small bunch of sweet herbs, a large onion, Cayenne pepper, and salt to taste; boil it briskly for 5 hours, strain and pulp it; then add a little spinach juice and asparagus boiled and cut into small pieces. A teaspoonful of walnut soy, and a teaspoonful of mushroom catsup, answers as well as the bone.

To make giblet soup.

Take 4 pounds of gravy beef, 2 pounds of scrag mutton, and 2 pounds of scrag of veal: boil them in 2 gallons of water, stew them gently till it begins to taste well, pour it out and let it stand till cold, skim off all the fat. Take 2 pair of giblets well scaled, put them to the broth, and simmer them till they are very tender. Take them out and strain the soup through a cloth. Put a piece of butter rolled in flour into the stew pan, with some fine chopped parsley, chives, a little penny royal, and sweet marjoram. Place the soup over a slow fire, put in the giblets, fried butter, herbs, a little Madeira wine, some salt, and Cayenne pepper; when the herbs are tender, send the soup giblets intermixed to table. This forms a very savoury dish.

White soup.

Stew a knuckle of veal and a scrag of mutton three or four hours, with spice; strain it; blanch 1-2 a pound of sweet almonds, beat them with a spoonful or two of cream to prevent their oiling; put them with a pint of cream into the soup, stir it, and give it a boil: strain it through a cloth, squeeze the almonds as dry as possible, heat it again, and thicken it as a custard with eggs; put a toasted roll in the tureen, and pour the soup over it. If there is a breast of cold fowl or veal, less almonds will do; if the meat be stewed and strained the day before, it does much bettter.

Charitable soup.

Take the liquor of meat boiled the day before, with the bones of leg and shin of beef; add to the liquor as much as will make 130 quarts, also the meat of 10 stones of leg and shin of beef, and 2 ox heads, all cut in pieces; add 2 bunches of carrots, 4 bunches of turnips, 2 bunches of leeks, 1-2 a peck of onions, 1 bunch of celery, 1-2 a lb. of pepper, and some salt. Boil it for six hours. Either oatmeal or barley may be put in to thicken it, if thought necessary. This soup may be used at any gentleman's table.

To make veal gravy soup.

Garnish the bottom of the stew-pan with thin pieces of lard, then a few slices of ham, slices of veal cutlet, sliced onions, carrots, parsnips, celery, a few cloves upon the meat, and a spoonful of broth; soak it on the fire in this manner till the veal throws out its juice; then put it on a stronger fire, till the meat catches to the bottom of the pan, and is brought to a proper colour: then add a sufficient quantity of light broth, and simmer it on a slow fire till the meat is thoroughly done; add a little thyme and mushrooms. Skim and sift it clear for use.

Beef gravy soup.

Cut slices of lean beef, according to the quantity wanted, which place in a stew-pan, upon sliced onions and roots adding two spoonsful of fat broth; soak this on a slow fire for half an hour, stirring it well; when it catches a proper colour, add thin broth made of suitable herbs, with a little salt over it.

A poor man's soap.

Pick a handful of parsley leaves, mince them fine, and strew over a little salt; shred six green onions, and put them with the parsley in a sauce-boat. Add three table-spoonsful of oil and vinegar, with some pepper and salt.

A cheap rice and meat soup.

Put a pound of rice and a little pepper and broth herbs, into two quarts of water; cover them close, and simmer very softly; put in a a little cinnamon, two pounds of good ox-cheek, and boil the whole till the goodness is incorporated by the liquor.

Another cheap soup.—Take an ox cheek, two pecks of potatoes, a quarter of a peck of onions, three quarters of a pound of salt, and an ounce and a half of pepper—to be boiled in ninety pints of water, on a slow fire until reduced to sixty. A pint of this soup, with a small piece of meat, is a good meal for a hearty working man. Some of every vegetable, with a few herbs, may be added.

Herring soup.

Take eight gallons of water, and mix it with five pounds of barley-meal. Boil it to the consistence of a thick jelly. Season it with salt, pepper, vinegar, sweet herbs, and to give it a gratifying flavour, add the meat of four red herrings pounded.

To prepare a nutritious soup.

A pound of Scotch barley, with sufficient time allowed in the cooking, will make a gallon of water into a tolerable pudding consistency. A pint basin filled with it will hold a spoon upright, when at its proper degree of warmth for eating. Thoroughly steeped, it will produce a rich pulp, the form of the grains being nearly lost. Five hours' exposure in a moderately heated oven, will be sufficient; and it may be improved by an hour or two more.

Amongst other means for such preparation, when a baker's oven has been emptied of its bread, a pan of one gallon size may be put in to steep its contents during the preceding night, and then renewing the usual baking in the morning. What has been lost by evaporation, may be renewed by the addition of warm water. All the seasoning requisite to make it as savory as plain family dishes generally are, will be about three large onions, one ounce of salt, and a quarter of an ounce of pepper. This seasoning should be put in before sending it to the oven.

To make jelly broth.

Put into the stew-pan, slices of beef, veal fillet, a fowl, and one or two partridges, according to the quantity required. Put it on the fire without liquid, until it catches a little, and add the meat now and then. To give it a proper colour, add some good clear boiling broth and scalded roots, as carrots, turnips, parsnips, parsley roots, celery, large onions, two or three cloves, a small bit of nutmeg and whole pepper; boil it on a slow fire about four or five hours with attention; and add a few cloves of garlic or shalots and a small faggot, or bunch of parsley and thyme tied together. When it is of a good yellow colour, sift it; it serves for sauces, and adds strength to the soups.

To make cooling broth.

The herbs, fruits, seeds, flowers, or roots which are employed for cooling broth, are purslain, lettuces, chervil, leeks, borage, burnet, sorrel, garden and wild endive, bugloss, hop-tops, cos lettuces, young nettles, cucumbers, tops of elder, dandelion, liver-wort, fumitory, beet roots, &c. Wash and chop a proper quantity, according to order, and boil a short time in thin veal or chicken broth; sift and keep it in a cool place. Warm it for use without boiling.

To make common sauce.

Soak slices of veal, ham, onions, parsnips, two cloves of garlic, two heads of cloves, then add broth, a glass of white wine, and two slices of lemon; simmer it over a slow fire, skim it well, and sift it; add 3 cloves of rocambole, bruised.

Sweet sauce.

Mix two glasses of red wine, one of vinegar, three spoonsful of cullis, a bit of sugar, one sliced onion, a little cinnamon, and a laurel-leaf; boil them a quarter of an hour.

Miser's sauce.

Chop five or six large onions, mix a little verjuice, or vinegar, pepper, salt, and a little butter; serve it up either warm or cold.

Pontiff's sauce.

Soak slices of veal, ham, sliced onions, carrots, parsnips, and a white head of celery: add a glass of white wine, as much good broth, a clove of garlic, four shalots, one clove, a little coriander, and two slices of peeled lemons. Boil on a slow fire till the meat is done; skim it and sift in a sieve; add a little catsup, and a small quantity of fine chopped parsley, just before it is used.

Housewife's sauce.

Take some of the above sauce sifted without gravy, add a bit of butter rolled in flour, and chopped chervil: use it when warm.

Parson's sauce.

Chop lemon-peel very fine, with two or three pickled cucumbers, a bit of butter, salt, and coarse pepper; a little flour, with two spoonsful of catsup, and stew it on the fire without boiling.

Nun's sauce.

Put slices of veal and ham, in a stew pan, with a spoonful of oil, two mushrooms, a faggot of parsley, a clove of garlic, two heads of cloves, half a leaf of laurel; let it catch a little on the fire; then add some good broth, a little gravy, and some white wine; simmer it for some time, skim it well, and sift in a sieve. When ready, add two or three green shalots, and a dozen of pistachionuts, whole.

Admiral's sauce.

Chop an anchovy, capers, and seven or eight green rocamboles; simmer them on the fire with a little salt, pepper, grated nutmeg, and butter rolled in flour; when ready, add a lemon squeezed.

To make sauce piquante.

Put a bit of butter with two sliced onions into a stew pan, with a carrot, a parsnip, a little thyme, laurel, basil, two cloves, two shalots, a clove of garlic, and some parsley; turn the whole over the fire until it be well coloured; then shake in some flour, and moisten it with some broth, and a spoonful of vinegar. Let it boil over a slow fire: skim, and strain it through a sieve. Season it with salt and pepper, and serve it with any dish required to be heightened.

To make a dish of maccaroni.

Boil four ounces of maccaroni till it is quite tender, then lay it on a sieve to drain, and put it into a stew-pan with about a gill of cream, and a piece of butter rolled in flour; stew it five minutes and pour it on a plate. Lay Parmesan cheese toasted all over it, and send it up in a water-plate.

To make sauce Italienne.

Put a piece of butter into the stew-pan, with mushrooms, onion, parsley, and the half of a laurel leaf, all cut fine; turn the whole over the fire some time, and shake in a little flour; moisten it with a glass of white wine, and as much good broth; add salt, pepper, and a little mace; beat all fine. Let it boil half an hour: then skim away the fat, and serve it up. A fine flavour may be given to it whilst boiling, by putting in a bunch of sweet herbs, which take out before the dish is served up.

Nonpareil sauce.

Take a slice of boiled ham, as much breast of roasted fowl, a pickled cucumber, a hard yolk of an egg, one anchovy, a little parsley, and a head of shalot, chopped very fine; boil it a moment in good catsup, and use it for meat or fish.

Nivernoise sauce.

Put in a small stew-pan a couple of slices of ham, a clove of garlic, two cloves, a laurel-leaf, sliced onions and roots: let it catch the fire a little. Then add a small quantity of broth, two spoonsful of catsup, and a spoonful of the best vinegar. Simmer it for an hour on the side of a stove, then sift it in a sieve, and serve it for a high flavoured sauce.

To make gravy cakes.

Chop two legs of beef in pieces, put them into a pot of water, stew it over a slow fire a day and a night; then add onions, herbs and spices as for gravy; continue stewing it till the meat is off the bones, and the gravy quite out; then strain the liquor into a milk-pan, to which quantity it should be reduced; when cold, take off the fat, put it into a saucepan, and add whatever is required to flavour it; simmer it on a slow fire till reduced to about twelve saucers two-thirds full; put them in an airy place till as dry as leather, put them in paper bags, and keep in a dry place.

To make general's sauce.

To make this sauce properly, infuse all the following ingredients for twenty-four hours, on ashes in an earthen pot, if possible, which must be very well stopped; viz. split six shalots, a clove of garlic, two laurel leaves, thyme and basil in proportion, truffles, tarragon leaves, half an ounce of mustard seed bruised, six small pieces of Seville orange peel, a quarter of an ounce of cloves, as much mace, half an ounce of long pepper, two ounces of salt; squeeze in a whole lemon, and add half a glass of verjuice, five spoonsful of vinegar, and a pint of white wine; let it settle, and sift it very clear. This may be kept, bottled, a long time, and it will serve for all sorts of meat and fish—but it must be used in moderation.

Sailor's sauce.

Chop a fowl's liver with two or three shalots, and a couple of truffles or mushrooms; simmer these in a spoonful of oil, two or three spoonsful of gravy, a glass of white wine, a little salt and coarse pepper; simmer it about half an hour, and skim it very well before using.

Queen's sauce.

Simmer crumbs of bread in good gravy, until it is quite thick, take it off the fire, and add a few sweet almonds pounded, two hard yolks of eggs, and a breast of fowl roasted, all pounded very fine; boil a sufficient quantity of cream to your sauce, and sift it all together, then add pepper and salt, and warm it without boiling.

Carach sauce.

Take three cloves of garlic, each cut in half, half an ounce of Cayenne pepper, and a spoonful or two each of Indian soy and walnut pickle; mix it in a pint of vinegar, with as much cochineal as will colour it.

To make tomata catsup.

Boil tomatas, full ripe, in their juice, to nearly the consistence of a pulp, pass them through a hair sieve, and add salt to the taste. Aromatize it sufficiently with clove, pepper, and nutmegs.

Catsup for sea-store.

Take a gallon of strong stale beer, a pound of anchovies washed from the pickle, the same of shalots peeled: half an ounce of mace, half an ounce of cloves, a quarter of an ounce of whole pepper, three or four large races of ginger, and two quarts of large mushroom flaps, rubbed to pieces. Cover these close, and let it simmer till half wasted. Then strain it through a flannel bag; let it stand till quite cold, and then bottle it. This may be carried to any part of the world; and a spoonful of it to a pound of fresh butter melted, will make a fine fish sauce, or will supply the place of gravy sauce. The stronger and staler the beer, the better will be the catsup.

Another.—Chop twenty-four anchovies, having first boned them: Put to them ten shalots cut small, and a handful of scraped horse-radish, a quarter of an ounce of mace, a quart of white wine, a pint of water, and the same quantity of red wine; a lemon cut into slices, half a pint of anchovy liquor, twelve cloves, and the same number of pepper-corns. Boil them together, till it comes to a quart, then strain it off, cover it close, and keep it in a cold dry place. Two spoonsful of it will be sufficient for a pound of butter. It is a good sauce for boiled fowls, or, in the room of gravy, lowering it with hot water, and thickening it with a piece of butter, rolled in flour.

To make fish sauce.

Take walnuts at the season for pickling, slice them into an earthen pan, between every layer throw a small handful of salt, stir it with a wooden stirrer every day for a fortnight; strain the liquor through a coarse cloth, and let it stand to settle; pour off the clear, and boil it with a pound of anchovies to each pint; skim it, and let it stand to cool; give it another boil, add one pint of red port, and one of best white wine vinegar to each pint of liquor; also mace, cloves, and nutmegs, of each, half a quarter of an ounce, some flour of mustard, sliced horse radish, and shalot, or a clove of garlic in each bottle.

Keep it well corked with a bladder tied over. The spice may be bruised or not, as desired, and add a little whole black or Jamaica pepper, as thought best.

Another.—Take one pound of anchovies, a quart of claret, three quarters of a pint of white wine vinegar, half an ounce of cloves and mace, two races of ginger sliced, a little black pepper, the peel of a lemon, a piece of horse-radish, a large onion, a bunch of thyme and savory; set all these over a slow fire to simmer an hour, then strain it through a sieve; when cold, put it into a bottle with the spice, but not the herbs. To a large coffee-cupful cold, put a pound of butter; stir it over the fire till it is as thick as cream; shake the bottle when used, and put no water to the butter.

To make cream sauce for a hare.

Run the cream over the hare or venison just before frothing it, and catch it in a dish; boil it up with the yolks of two eggs, some onion, and a piece of butter rolled in flour and salt. Half a pint of cream is the proportion for two eggs.

To make ragout of asparagus.

Scrape one hundred of grass clean; put them into cold water; cut them as far as is good and green, chop small two heads of endive, a young lettuce, and an onion. Put a quarter of a pound of butter into the stew pan, and when it is melted, put in the grass with the other articles. Shake them well, and when they have stewed ten minutes, season them with a little pepper and salt; strew in a little flour, shake them about, and then pour in half a pint of gravy. Stew the whole till the sauce is very good and thick, and then pour all into the dish. Garnish with a few of the small tops of the grass.

The same of mushrooms.—Broil on a grid-iron some large peeled mushrooms, and clean off the inside; when the outside is brown, put them into a stew-pan with a sufficient quantity of water to cover them; when they have stewed ten minutes, put to them a spoonful of white wine, the same of browning, and a little vinegar. Thicken it with butter and flour, give a gentle boil, and serve it up with sippets round the dish.

Of artichoke bottoms.—Soak them in warm water for two or three hours, changing the water; then put them into the stew pan with some good gravy, mushroom catsup, or powder. Add a little Cayenne pepper, and salt when they boil; thicken them with a little flour, put them into the dish with sauce over them, and serve them hot.

Of calves' sweet-breads.—Scald two or three sweet-breads, cut each into three or four pieces, and put them into a stew pan with mushrooms, butter, and a faggot of sweet herbs; soak these together a moment, then add broth and gravy; simmer on a slow fire, skim the sauce well, and reduce it; season with pepper, salt, and lemon juice when ready.

Of roots.—Cut carrots and parsnips to the length of a finger, and of much the same thickness; boil them till half done in water, put them into a stew pan with small bits of ham, chopped parsley, and shalots, pepper and salt, a glass of wine and broth; let them stew slowly until the broth is reduced pretty thick, and add the squeeze of a lemon when ready to serve. For maigre, instead of ham, use mushrooms, and make a mixture beat up with yolks of eggs and maigre broth. Celery is done much the same, only it is cut smaller. If these roots are to be served in a boat for sauce, boil them tender in the broth pot, or in water, cut them into the desired length, and serve with a good gravy or white sauce.

PASTRY, &c.

To make a rich plum cake.

Take one pound of fresh butter, one pound of sugar, one pound and a half of flour, two pounds of currants, a glass of brandy, one pound of sweetmeats, two ounces of sweet almonds, ten eggs, a quarter of an ounce of allspice, and a quarter of an ounce of cinnamon.

Melt the butter to a cream, and put in the sugar. Stir it till quite light, adding the allspice, and pounded cinnamon; in a quarter of an hour take the yolks of the eggs, and work them in, two or three at a time; and the whites of the same must by this time be beaten into a strong snow quite ready to work in; as the paste must not stand to chill the butter, or it will be heavy, work in the whites gradually: then add the orange peel, lemon, and citron, cut in fine stripes, and the currants, which must be mixed in well, with the sweet almonds. Then add the sifted flour and glass of brandy. Bake this cake in a tin hoop in a hot oven for three hours, and put twelve sheets of paper under it to keep it from burning.

A good plain cake.—The following is a receipt for making a good plain cake, to be given to children, at breakfast, instead of *buttered bread.*

Take as much dough as will make a quartern loaf (either made at home, or procured at the baker's) work into this a quarter of a pound of butter, a quarter of a pound of moist sugar, and a handful of caraway seeds. When well worked together, pull into pieces the size of a golden pippin, and work it together again. This must be done *three* times, or it will be in lumps, and heavy when baked.

To make iceing for cakes.

Put one pound of fine sifted, treble refined sugar into a basin, and the whites of three new-laid eggs; beat the sugar and eggs up well with a silver spoon, until it becomes very white and thick: dust the cake over with flour, and then brush it off, by way of taking the grease from the outside, which prevents the iceing from running; put it on smooth with a palette knife, and garnish according to fancy; any ornaments should be put on immediately; for if the iceing gets dry it will not stick on.

To make a rich seed cake.

Take a pound and a quarter of flour well dried, a pound of butter, a pound of loaf sugar, beat and sifted, eight eggs and two ounces of caraway seeds, one grated nutmeg, and its weight in cinnamon. Beat the butter into a cream, put in the sugar, beat the whites of the eggs and the yolks separately, then mix them with the butter and sugar. Beat in the flour, spices, and seed, a little before sending it away. Bake it two hours in a quick oven.

A plain pound cake.

Beat one pound of butter in an earthen pan until it is like a fine thick cream, then beat in nine whole eggs till quite light. Put in a glass of brandy, a little lemon peel, shred fine, then work in a pound and a quarter of flour; put it into the hoop or pan and bake it for an hour. A pound plum cake is made the same with putting one pound and a half of clean washed currants and half a pound of candied lemon peel.

Ratafia cakes.

Beat half a pound each, of sweet and bitter almonds in fine orange, rose, or ratafia water, mix half a pound of fine pounded and sifted sugar with the same, add the whites of four eggs well beaten to it, set it over a moderate fire in a preserving pan. Stir it one way until it is pretty hot, and when a little cool form it into small rolls, and cut it into thin cakes. Shake some flour, lightly on them, give each a light tap, and put them on sugar papers, sift a little sugar on them, and put them into a thorough slack oven.

To make wiggs.

Put half a pint of warm milk, to three quarters of a pound of fine flour; mix in it two or three spoonsful of light yeast. Cover it up, and set it before the fire an hour, in order to make it rise. Work into it four ounces each, of sugar and butter, make it into cakes, or wiggs, with as little flour as possible, and a few caraway seeds, and bake them quick.

To make bath cakes.

Mix well together, half a pound of butter, one pound of flour, five eggs, and a cupful of yeast. Set the whole before the fire to rise, which effected, add a quarter of a pound of fine powdered sugar, an ounce of caraways well mixed in, and roll the paste out into little cakes. Bake them on tins.

Shrewsbury cakes.

Mix half a pound of butter well beat like cream, and the same weight of flour, one egg, six ounces of beaten and sifted loaf sugar, and half an ounce of caraway seeds. Form these into a paste, roll them thin, and lay them in sheets of tin; then bake them in a slow oven.

To make Portugal cakes.

Mix into a pound of fine flour, a pound of loaf sugar, beat and sifted, and rub it into a pound of butter, till it is thick, like grated white bread; then put to it two spoonsful of rose-water, two of sack, and ten eggs; work them well with a whisk, and put in eight ounces of currants. Butter the tin pans, fill them half full, and bake them. If made without currants they will keep a year.

Ginger cakes without butter.

Take one pound of sugar, a quarter of a pound of ginger, a pint of water, two pounds of flour and eight caps of orange peel. Pound and sift the ginger, and add a pint of water; boil it five minutes, then let it stand till cold. Pound the preserved orange peel, and pass it through a hair-sieve; put the flour on a pasteboard, make a wall, and put in the orange peel and ginger with the boiled water: mix this up to a paste and roll it out; prick the cakes before baking them.

Savoy cakes.

To one pound of fine sifted sugar, put the yolks of ten eggs, (have the whites in a separate pan,) and set it, if in summer, in cold water: if there is any ice set the pan on it, as it will cause the eggs to be beat finer. Then beat the yolks and sugar well with a wooden spoon for 20 minutes, and put in the rind of a lemon grated; beat up the whites with a whisk, until they become quite stiff and white as snow. Stir them into the batter by degrees, then add 3-4 of a pound of well dried flour; finally, put it in a mould in a slack oven to bake.

Saffron cakes.

Take a quartern of fine flour, 1 1-2 lbs. of butter, 3 oz. of caraway-seeds, 6 eggs, well beaten, 1-4 of an oz. of well beaten cloves and mace, a little pounded cinnamon, 1 lb. of sugar, a little rose-water and saffron, a pint and a half of yeast, and a quart of milk. Mix them thus: first boil the milk and butter, then skim off the butter, and mix it with the flour and a little of the milk. Stir the yeast into the rest and strain it: mix it with the flour, put in the eggs and spice, rose water, tincture of saffron, sugar, and eggs. Beat it all well up, and bake it in a hoop or pan well buttered. Send it to a quick oven, and an hour and a half will do it.

Queen cakes.

Take a pound of sugar, beat and sift it, a pound of well dried flour, a pound of butter, eight eggs, and half a pound of currants washed and picked: grate a nutmeg and an equal quantity of mace and cinnamon, work the butter to a cream, put in the sugar, beat the whites of the eggs 20 minutes, and mix them with the butter and sugar. Then beat the yolks for half an hour and put them to the butter. Beat the whole together, and when it is ready for the oven, put in the flour, spices, and currants; sift a little sugar over them, and bake them in tins.

Rice cakes.

Beat the yolks of 15 eggs for nearly half an hour, with a whisk, mix well with them 10 ounces of fine sifted loaf sugar, put in half a pound of ground rice, a little orange water or brandy, and the rinds of two lemons grated, then add the whites of seven eggs well beaten, and stir the whole together for a quarter of an hour. Put them into a hoop and set them in a quick oven for half an hour, when they will be properly done.

Lemon cakes.

Take one pound of sugar, three quarters of a pound of flour, 14 eggs, two table spoonsful of rose-water, the raspings and juice of four lemons; when the yolks are well beat up and separated, add the powder sugar, the lemon raspings, the juice and the rose-water; beat them well together in a pan with a round bottom, till it becomes quite light, for half an hour. Put the paste to the whites previously well whisked about, and mix it very light. When well mixed sift in the flour and knead it in with the paste, as light as possible; form the biscuits and bake them in small oval tins, with six sheets of paper under them, in a moderate heat. Butter the tins well or it will prove difficult to take out the biscuits, which will be exceedingly nice if well made. Ice them previous to baking, but very lightly and even.

To make Banbury cakes.

Take a pound of dough made for white bread, roll it out, and put bits of butter upon the same as for puff paste, till a pound of the same has been worked in; roll it out very thin, then cut it into bits of an oval size, according as the cakes are wanted. Mix some good moist sugar with a little brandy, sufficient to wet it, then mix some clean washed currants with the former, put a little upon each bit of paste, close them up, and put the side that is closed next the tin they are to be baked upon. Lay them separate, and bake them moderately, and afterwards, when taken out, sift sugar over then. Some candied peel may be added or a few drops of the essence of lemon.

Almond cakes.

Take six ounces of sweet almonds, half a pound of powdered sugar, seven eggs, six ounces of flour, and the raspings of four lemons. Pound the almonds very fine, with whole eggs, add the sugar and lemon raspings, and mix them well together in the mortar. Take it out, put it in a basin and stir it with the yolks of eggs, till it is as white as a sponge paste; beat up the whites of the eggs to a strong snow, mix them very light with the paste, then take the flour and mix it as light as possible; on this the goodness of the paste principally depends, as it is impossible to make a good cake with a heavy paste; butter the mould and bake in a slack oven for an hour, with ten sheets of paper under it and one on the top.

To make plain gingerbread.

Mix three pounds of flour with four ounces of moist sugar, half an ounce of powdered ginger, and one pound and a quarter of warm treacle; melt half a pound of fresh butter in it; put it to the flour and make it a paste; then form it into nuts or cakes or bake it in one cake.

Another method.—Mix six pounds of flour with two ounces of caraway seeds, two ounces of ground ginger, two ounces of candied orange peel, the same of candied lemon peel cut in pieces, a little salt, and six ounces of moist sugar; melt one pound of fresh butter in about half a pint of milk, pour it by degrees into four pound of treacle, stir it well together, and add it, a little at a time, to the flour; mix it thoroughly; make it into a paste; roll it out rather thin, and cut into cakes with the top of a dredger or wine glass; put them on floured tins, and bake them in rather a brisk oven.

To make cream cakes.

Beat the whites of nine eggs to a stiff froth, stir it gently with a spoon lest the froth should fall, and to every white of an egg grate the rinds of two lemons; shake in gently a spoonful of double refined sugar sifted fine, lay a wet sheet of paper on a tin, and with a spoon drop the froth in little lumps on it near each other. Sift a good quantity of sugar over them, set them in the oven after the bread is out, and close up the mouth of it, which will occasion the froth to rise. As soon as they are coloured they will be sufficiently baked; lay them by two bottoms together on a sieve, and dry them in a cool oven.

To make crumpets.

Set 2 lbs. of flour with a little salt before the fire till quite warm; then mix it with warm milk and water till it is as stiff as it can be stirred; let the milk be as warm as it can be borne with the finger, put a cupful of this with 3 eggs well beaten, and mixed with 3 spoonsful of very thick yeast; then put this to the batter and beat them all well together in a large pan or bowl, add as much milk and water as will make it into a thick batter; cover it close and put it before the fire to rise; put a bit of butter in a piece of thin muslin, tie it up, and rub it lightly over the iron hearth or frying pan; then pour on a sufficient quantity of batter at a time to make one crumpet; let it do slowly, and it will be very light. Bake them all the same way. They should not be brown, but of a fine yellow.

To make muffins.

Mix a quartern of fine flour, 1 1-2 pints of a warm milk and water, with a 1-4 of a pint of good yeast, and a little salt; stir them together for a quarter of an hour, then strain the liquor into a quarter of a peck of fine flour; mix the dough well and set it to rise for an hour, then roll it up and pull it into small pieces, make them up in the hand like balls and lay a flannel over them while rolling, to keep them warm. The dough should be closely covered up the whole time; when the whole is rolled into balls, the first that are made will be ready for baking. When they are spread out in the right form for muffins, lay them on tins and bake them, and as the bottoms begin to change colour turn them on the other side.

To make common buns.

Rub four ounces of butter into two pounds of flour, a little salt, four ounces of sugar, a dessert spoonful of caraways, and a tea-spoonful of ginger; put some warm milk or cream to four table spoonsful of yeast; mix all together into a paste, but not too stiff; cover it over and set it before the fire an hour to rise, then make it into buns, put them on a tin, set them before the fire for a quarter of an hour, cover over with flannel, then brush them with very warm milk and bake them of a nice brown in a moderate oven.

To make cross buns.

Put 2 1-2 lbs. of fine flour into a wooden bowl, and set it before the fire to warm; then add 1-2 a lb. of sifted sugar, some coriander seed, cinnamon and mace powdered fine; melt 1-2 lb. of butter in a half a pint of milk; when it is as warm as it can bear the finger, mix with it three table spoonsful of very thick yeast, and a little salt; put it to the flour, mix it to a paste, and make the buns as directed in the last receipt. Put a cross on the top, not very deep.

To make rusks.

Beat up seven eggs, mix them with half a pint of warm new milk, in which a quarter of a pound of butter has been melted, add a quarter of a pint of yeast, and three ounces of sugar; put them gradually into as much flour as will make a light paste nearly as thin as batter; let it rise before the fire half an hour, add more flour to make it a little stiffer, work it well and divide it into small loaves, or cakes, about five or six inches wide, and flatten them. When baked and cold put them in the oven to brown a little. The cakes when first baked are very good buttered for tea, if they are made with caraway seeds they eat very nice cold.

To make orange custards.

Boil very tender the rind of half a Seville orange, and beat it in a mortar until it is very fine; put to it a spoonful of the best brandy, the juice of a Seville orange, four ounces of loaf sugar, and the yolk of four eggs. Beat them all together for ten minutes, and then pour in by degrees a pint of boiling cream; beat them until cold, then put them in custard cups, in a dish of hot water; let them stand till they are set, then take them out and stick preserved orange peel on the top; this forms a fine flavoured dish, and may be served up hot or cold.

Baked custards.

Boil a pint of cream with some mace and cinnamon, and when it is cold, take four yolks of eggs, a little rose water, sack, nutmeg, and sugar, to taste; mix them well and bake them.

Rice custards.

Put a blade of mace, and a quartered nutmeg into a quart of cream; boil and strain it, and add to it some boiled rice and a little brandy. Sweeten it to taste, stir it till it thickens, and serve it up in cups or in a dish; it may be used either hot or cold.

Almond custards.

Blanch a quarter of a pound of almonds, beat them very fine, and then put them into a pint of cream, with two spoonsful of rose water; sweeten it, and put in the yolks of four eggs; stir them well together till it becomes thick, and then pour it into cups.

Lemon custards.

Take half a pound of double refined sugar, the juice of two lemons, the rind of one pared very thin, the inner rind of one boiled tender and rubbed through a sieve, and a pint of white wine; boil them for some time, then take out the peel and a little of liquor; strain them into the dish, stir them well together and set them to cool.

To make almond tarts.

Blanch and beat fine some almonds, with a little white wine and some sugar (a pound of sugar to a pound of almonds,) grated bread, nutmeg, cream, and the juice of spinach, to colour the almonds. Bake it in a gentle oven, and when done, thicken with candied orange peel or citron.

Green almond tarts.

Pull the almonds from the tree before they shell, scrape off the down, and put them into a pan with cold spring water; then put them into a skillet with more spring water: set it on a slow fire, and let it remain till it simmers. Change the water twice, and let them remain in the last till tender, then take them out and dry them well in a cloth. Make a syrup with double refined sugar, put them into it and let them simmer; do the same the next day, put them into a stone jar, and cover them very close, for if the least air comes to them they will turn black; the yellower they are before they are taken out of the water, the greener they will be after they are done. Put them into the crust, cover them with syrup, lay on the lid, and bake them in a moderate oven.

To make orange or lemon pie.

Rub six oranges or lemons with salt, and put them into water, with a handful of salt, for two days. Put every day fresh water without salt, for a fortnight. Boil them tender, cut them into half quarters, cornerways, quite thin; boil six pippins pared, cored, and quartered, in a pint of water till they break, then put the liquor to the oranges or lemons, with half the pulp of the pippins well broken, and a pound of sugar; boil them a quarter of an hour, then put them into a pot and squeeze in two spoonsful of the juice of either orange or lemon, according to the kind of tart; put puff paste, very thin, into shallow patty-pans. Take a brush, and rub them over with melted butter, sift double refined sugar over them, which will form a pretty iceing, and bake them.

To make orange tarts.

Grate a little of the outside of a Seville orange, squeeze the juice into a dish, put the peel into water, and change it often for four days, then put it into a saucepan of boiling water on the fire; change the water twice to take out the bitterness, and when tender, wipe and beat them fine in a mortar; boil their weight in double refined sugar into a syrup, and skim it, then put in the pulp and boil all together till clear; when cold put it into the tarts, and squeeze in the juice, and bake them in a quick oven. Conserve of orange makes good tarts.

Orange puffs.

Pare off the rinds from Seville oranges, then rub them with salt, let them lie twenty-four hours in water, boil them in four changes of water, make the first salt, drain and beat them to a pulp; bruise in the pieces of all that are pared, make it very sweet with loaf sugar, and boil it till; thick let it stand till cold, and then put it into the paste.

To make English macaroons.

One pound of sweet almonds, 1 pound and a quarter of sugar, 6 whites of eggs, and the raspings of 2 lemons. Pound the almonds very fine with 6 whites of eggs, feel the almonds, and if they are free from lumps, they will do; then add the powdered sugar, and mix it well with the lemon raspings. Dress them in wafer paper of the required shape; bake them in a moderate heat, then let them stand till cold, cut the wafer paper round them, but leave it on the bottoms.

To make fancy biscuits.

Take 1 pound of almonds, 1 pound of sugar, and some orange flower water. Pound the almonds very fine, and sprinkle them with orange flower water; when they are perfectly smooth to the touch, put them in a small pan, with flour sifted through a silk sieve; put the pan on a slow fire, and dry the paste till it does not stick to the fingers; move it well from the bottom to prevent its burning; then take it off, and roll it into small round fillets, to make knots, rings, &c, and cut it into various shapes; make an iceing of different colours, dip one side of them in it, and set them in it, and set them on wire gratings to drain. They may be varied by strewing over them coloured pistachios, or coloured almonds, according to fancy.

Sponge biscuits.

Beat the yolks of 12 eggs for half an hour; then put in 1 1-2 pounds of beaten sifted sugar, and whisk it till it rises in bubbles; beat the whites to a strong froth, and whisk them well with the sugar and yolks, work in 14 oz. of flour, with the rinds of 2 lemons grated. Bake them in tin moulds buttered, in a quick oven, for an hour; before they are baked, sift a little fine sugar over them.

To make fine cheesecakes.

Put a pint of warm cream into a saucepan over the fire, and when it is warm, add to it 5 quarts of new milk. Then put in some rennet, stir it, and when it is turned, put the curd into a linen cloth or bag. Let the whey drain from it, but do not squeeze it too much. Put it into a mortar, and pound it as fine as butter. Add half a pound of sweet almonds blanched, half a pound of macaroons, or Naples biscuit. Then add 3 well beaten yolks of eggs, a grated nutmeg, a little rose or orange water, and half a pound of fine sugar. Mix all well together.

Almond cheesecakes.

Put 4 ounces of blanched sweet almonds into cold water, and beat them in a marble mortar or wooden bowl, with some rose water. Put to it 4 ounces of sugar, and the yolks of 4 eggs beat fine. Work it till it becomes white and frothy, and then make a rich puff paste as follows: Take 1-2 a lb. of flour, and 1-4 of a lb. of butter; rub a little of the butter into the flour, mix it stiff with a little cold water, and then roll out the paste. Strew on a little flour and lay over it in thin bits 1-3d of the butter, throw a little more flour over the bottom, and do the like three different times. Put the paste into the tins, grate sugar over them, and bake them gently.

Bread cheesecakes.

Slice a penny loaf as thin as possible, pour on it a pint of boiling cream, and let it stand two hours. Beat together eight eggs, half a pound of butter, and a grated nutmeg: mix them into the cream and bread with half a pound of currants well washed and dried, and a spoonful of white wine or brandy. Bake them in patty pans, on a raised crust.

Rice cheesecakes.

Boil 4 ounces of rice till it is tender, and then put it into a sieve to drain; mix with it 4 eggs well beaten up, 1-2 a lb. butter, 1-2 a pint of cream, 6 oz. sugar, a nutmeg grated, a glass of brandy or ratafia water. Beat them all well together, then put them into raised crusts, and bake them in a moderate oven.

To make apple cakes.

Take half a quartern of dough, roll it out thin: spread equally over it 5 ounces each of coffee and sugar, a little nutmeg or allspice, and 2 ounces of butter; then fold and roll it again two or three times, to mix well the ingredients. Afterwards roll it out thin, and spread over it 4 rather large apples, pared, cored, and chopped small; fold it up, and roll until mixed. Let it stand to rise after. Half a pound of butter may be added.

To make blancmange.

Put into 1 quart of water an ounce of isinglass, and let it boil till it is reduced to a pint; then put in the whites of 4 eggs with 2 spoonsful of rice water, and sweeten it to taste. Run it through a jelly bag, and then put to it 2 ounces of sweet, and 1 ounce of bitter almonds. Scald them in the jelly, and then run them through a hair sieve. Put it into a china bowl, and the next day turn it out. Garnish with flowers or green leaves, and stick all over the top blanched almonds cut lengthways.

Clear blancmange.

Skim off the fat, and strain a quart of strong calf's foot jelly, add to the same the whites of 4 eggs well beaten, set it over the fire and stir it till it boils. Then pour it into a jelly bag, and run it through several times till it is clear. Beat an ounce each of sweet and bitter almonds to a paste with a spoonful of rose water strained through a cloth. Then mix it with the jelly, and add to it 3 spoonsful of very good cream. Set it again over the fire and stir it till it almost boils. Pour it into a bowl; then stir it often till almost cold: and then fill the moulds.

CONFECTIONARY.

To prepare sugar for candying.

The first process is *clarifying*, which is done thus. Break the white of an egg into a preserving pan; put to it 4 quarts of water, and beat it with a whisk to a froth. Then put in 12 pounds of sugar, mix all together, and set it over the fire. When it boils put a little cold water, and proceed as often as necessary, till the scum rises thick on the top. Then remove it from the fire, and when it is settled, take off the scum, and pass it through a straining bag. If the sugar should not appear very fine, boil it again before straining it.

To candy sugar.

After having completed the above first process, put what quantity is wanted over the fire, and boil it till it is smooth enough. This is known by dipping the skimmer into the sugar, and touching it between the forefinger and thumb; and immediately on opening them a small thread will be observed drawn between, which will crystallize and break, and remain in a drop on the thumb, which will be a sign of its gaining some degree of smoothness. Boil it again, and it will draw into a larger string; it is now called *bloom sugar*, and must be boiled longer than in the former process. To try its forwardness, dip again the skimmer shaking off the sugar into the pan; then blow with the mouth strongly through the holes, and if certain bladders go through, it has acquired the second degree; to prove if the liquid has arrived at the state called *feathered sugar* re-dip the skimmer, and shake it over the pan, then give it a sudden flirt behind, and the sugar will fly off like feathers.

It now arrives to the state called *crackled sugar*, to obtain which the mass must be boiled longer than in the preceding degree; then dip a stick in it, and put it directly into a pan of cold water, draw off the sugar which hangs to the stick in the water, and if it turns hard and snaps, it has acquired the proper degree of crystallization, if otherwise, boil it again until it acquires that brittleness.

The last stage of refining this article is called *carmel sugar*, to obtain which it must be boiled longer than in any of the preceding methods; prove it by dipping a stick first into the sugar, and then into cold water, and the moment it touches the latter, it will, if matured, snap like glass. Be careful that the fire is not too fierce, as by flaming up the sides of the pan, it will burn, discolour, and spoil the sugar.

French method.—Put into a pan syrup enough of clarified sugar to fill the mould; boil it until it comes to the state called *small feather;* skim it well; take the pan from the fire, and pour it into a small quantity of spirit of wine sufficient to make it sparkle; let it rest till the skin, which is the candy, rises on the surface; take it off with a skimmer, and pour it directly into the mould; which keep in the stove at 90° heat for 8 days: then strain the candy by a hole, slanting the mould on a bason or pan to receive the drainings; let it drain till it is perfectly dry, then loosen the paper by moistening it with warm water; warm it all round near the fire, and turn the candy by striking it hard on the table. Put it on a sieve in the stove to finish drying it; but do not touch it while there, and keep up an equal heat, otherwise there will be only a mash instead of a candy. Spirit of wine will take off grease, and not affect the candy, as it soon evaporates.

To make barley sugar.

Take a quantity of clarified sugar in that state that on dipping the finger into the pan the sugar which adheres to it will break with a slight noise; this is called *crack.* When the sugar is near this, put in two or three drops of lemon juice, or a little vinegar to prevent its graining. When it has come to the *crack* take it off instantly, and dip the pan into cold water to prevent its burning; let it stand a little, and then pour it on a marble which must be previously rubbed with oil. Cut the sugar into small pieces, when it will be ready for use. One drop of citron will flavour a considerable quantity.

To make bon-bons.

Provide leaden moulds, which must be of various shapes, and be oiled with oil of sweet almonds. Take a quantity of brown sugar syrup in the proportion to their size, in that state called a *blow*, which may be known by dipping the skimmer into the sugar, shaking it, and blowing through the holes, when parts of light may be seen; add a drop of any esteemed essence. If the *bon-bons* are preferred white, when the sugar has cooled a little, stir it round the pan till it grains, and shines on the surface; then pour it into a funnel and fill the little moulds, when it will take a proper form and harden: as soon as it is cold take it from the moulds; dry it two or three days, and put it upon paper. If the *bon-bons* are required to be coloured, add the colour just as the sugar is ready to be taken off the fire.

To candy ginger.

Put 1 oz. of race ginger grated fine, a lb. of loaf sugar beat fine, into a preserving pan, with as much water as will dissolve the sugar. Stir them well together over a slow fire till the sugar begins to boil. Then stir in another pound of sugar, beat fine, and keep stirring it till it grows thick. Then take it off the fire, and drop it in cakes upon earthen dishes. Set them in a warm place to dry, when they will become hard and brittle, and look white.

To candy horehound.

Boil it in water till the juice is extracted; then boil a sufficient quantity of sugar to a great height, and add the juice to it. Stir it with a spoon against the sides of the sugar pan, till it begins to grow thick, then pour it out into a paper case that is dusted with fine sugar, and cut it into squares: dry the horehound, and put it into the sugar finely powdered and sifted.

To make white sugar candy.

Sugar crystallized by the saturated syrup being left in a very warm place, from 90 to 100 deg. Fahrenheit, and the shooting promoted by placing sticks or a net of threads at small distances from each other in the liquor, it is also deposited from compound syrup, and does not retain any of the foreign substances with which the syrup is loaded.

To clarify loaf sugar.

Break the same into a copper pan, which will hold 1-3d more, put half a pint of water to each lb. of sugar, mix 1 white of egg to every 6 lbs.; when it rises in boiling, throw in a little cold water, which must be kept ready in case it should boil over; skim it the fourth time of rising, continue to throw in a little cold water each time till the scum ceases to rise, and strain it through a sieve, cloth, or flannel bag. Save the scum, which, when a certain quantity is taken off, may be clarified. The latter skimming will do to add to fermented wines.

To clarify coarse brown sugar.

Put 50 pounds of coarse brown sugar into a pan, which will contain 1-3d more, pour in 20 pints of water, well mixed with 5 whites of eggs; pound 5 lbs. of small charcoal, mix it in the pan while on the fire, and boil it till it looks as black as ink. If it rises too fast, add cold water, strain it through a bag, and though at first it will be black, continue to strain it until it becomes quite clear; which may be seen by putting the syrup in a glass. Put it back until it comes out as fine as clarified loaf sugar.

To improve and increase sugar.

To 5 lbs of coarse brown sugar, add 1 lb of flour, and there will be obtained 6 lbs. of sugar worth 10 per cent. more in colour and quality.

Starch sugar.

Mix 100 parts of starch with 200 of water, and add to it gradually another 200 of water, previously mixed with one of oil of vitriol, and brought to a boiling heat in a tinned copper vessel; keep the mixture boiling for thirty-six hours, and occasionally add water to keep up the original quantity, then add some powdered charcoal and also some chalk to get rid of the acid; strain and evaporate it by a gentle heat to the consistence of syrup and crystallize.

Birch sugar.

Wound the trees in the spring of the year by boring a hole under a large arm of the tree quite through the wood as far as the bark of the opposite side; collect the sap which flows from the wound, and evaporate it to a proper consistence: these are the native sugars of cold countries, and might be made in England for all the purposes of home consumption.

To make pear sugar.

It is obtained by expressing the juice, adding chalk to remove the superabundant acid, and evaporating it to a due consistence: it does not crystallize, and is a kind of white treacle. One hundred weight of apples yields about 84 lbs. of this juice, which will produce nearly 12 lbs. of this substance.

To make grape sugar.

The brown sugar obtained from grapes by the usual process, being previously freed from the acids, and sulphate of lime, that existed in the original juice, yields by refining 75 per cent. of a white granular sugar, 24 of a kind of treacle with a little gum, and some malate of lime.

To candy orange peel.

Soak the peels in cold water, which change frequently till they lose their bitterness; then put them into syrup till they become soft and transparent. Then they are to be taken out and drained.

Lemon peel.

This is made by boiling lemon peel with sugar, and then exposing to the air until the sugar crystallizes.

To colour candied sugar.

Red.—Boil an oz. of cochineal in half a pint of water for 5 minutes, add an oz. of cream of tartar, half an oz. of pounded alum, and boil them on a slow fire 10 minutes; if it shews the colour clear on white paper, it is sufficient. Add 2 oz. of sugar, and bottle it for use.

Blue.—Put a little warm water in a plate, and rub an indigo-stone in it till the colour has come to the tint required.

Yellow.—Rub with some water a little gamboge on a plate, or infuse the heart of a yellow lily flower with milk warm water.

Green.—Boil the leaves of spinach about a minute in a little water, and when strained bottle the liquor for use. In colouring refined sugars, taste and fancy must guide.

To make devices in sugar.

Steep gum tragacanth in rose-water, and with double refined sugar make it into a paste, and colour and mould it to fancy.

To make whipt syllabub.

Rub a lump of loaf sugar on the outside of a lemon, and put it into a pint of thick cream, and sweeten it to taste. Squeeze in the juice of a lemon, and add a glass of Madeira wine, or French brandy. Mill it to a froth with a chocolate mill, take off the froth as it rises, and lay it in a hair sieve. Fill one half of the glass with red wine, then lay the froth as high as possible, but take care that it is well drained in the sieve, otherwise it will mix with the wine, and the syllabub be spoiled.

To make a solid syllabub.

To a quart of rich cream put a quart of white wine, the juice of two lemons, with the rind of one grated, and sweeten it to taste. Whip it up well and take off the froth as it rises. Put it upon a hair sieve, and let it stand in a cool place till the next day. Then half fill the glasses with the scum, and heap up the froth as high as possible. The bottom will look clear and it will keep several days.

To make snow balls.

Pare and take out the cores of five large baking apples, and fill the holes with orange or quince marmalade. Then take some good hot paste, roll the apples in it, and make the crust of an equal thickness; put them in a tin dripping pan, bake them in a moderate oven, and when taken out, make iceing for them; let the same be a 1-4 of an inch thick, and set them a good distance from the fire until they become hardened, but be cautious that they are not browned.

To make capillaire.

Mix six eggs well beat up, with fourteen pounds of loaf sugar, and 3 pounds of coarse sugar. Put them into three quarts of water, boil it twice, skim it well, and add a 1-4 of a pint of orange flower water; strain it through a jelly-bag, and put it into bottles for use. A spoonful or two of this syrup put into a draught of either cold or warm water, makes it drink exceedingly pleasant.

To make confectionary drops.

Take double refined sugar, pound and sift it through a hair sieve, not too fine; then sift it through a silk sieve, to take out all the fine dust, which would destroy the beauty of the *drop*. Put the sugar into a clean pan, and moisten it with any favourite aromatic; if rose-water, pour it in slowly, stirring it with a paddle, which the sugar will fall from, as soon as it is moist enough, without sticking. Colour it with a small quantity of liquid carmine, or any other colour ground fine. Take a a small pan with a lip, fill it three parts with paste, place it on a small stove, the half hole being of the size of the pan, and stir the sugar with a little ivory or bone handle, until it becomes liquid. When it almost boils, take it from the fire and continue to stir it; if it be too moist, take a little of the powdered sugar, and add a spoonful to the paste, and stir it till it is of such a consistence as to run without too much extension. Have a tin plate, very clean and smooth; take the little pan in the left hand, and hold in the right a bit of iron, copper, or silver wire, four inches long, to take off the drop from the lip of the pan, and let it fall regularly on the tin plate; two hours afterwards take off the drops with the blade of a knife.

To make chocolate drops.

Scrape the chocolate to powder, and put an ounce to each pound of sugar; moisten the paste with clear water, work it as above, only take care to use all the paste prepared, as, if it be put on the fire a second time, it greases, and the drop is not of the proper thickness.

To make orange flower drops.

These are made as the sugar drops, only using orange flower water, or instead of it, use the essence of naroli, which is the essential oil of that flower.

Coffee drops.

An ounce of coffee to a pound of sugar will form a strong decoction; when cleared, use it to moisten the sugar, and then make the drops as above.

Peppermint drops.

The only requisites to make these are, extreme cleanliness, the finest sugar, and a few drops of the essence of peppermint.

Clove drops.

These are made as the cinnamon drops, the cloves being pounded, or the essence used. Good cloves should be black, heavy, of a pungent smell, hot to the taste, and full of oil.

Ginger drops.

Pound and sift through a silk sieve the required quantity of ginger, according to the strength wanted, and add it to the sugar with clear water. China ginger, is the best, being aromatic as well as hot and sharp tasted.

To make liquorice lozenges.

Take of extract of liquorice,—double refined sugar, each 10 oz.—tragacanth, powdered, 3 oz. Powder them thoroughly, and make them into lozenges with rose-water.—These are agreeable pectorals, and may be used at pleasure in tickling coughs. The above receipt is the easiest and best mode of making these lozenges. Refined extract of liquorice should be used; and it is easily powdered in the cold, after it has been laid for some days in a dry and rather warm place.

To make extract of liquorice.

The liquorice root is to be boiled in eight times its weight of water, to one half; the liquor is then to be expressed, and after the fæces have subsided, to be filtered; it is then to be evaporated, with a heat between 200° and 212°, until it becomes thickish; and, lastly, it is to be evaporated with a heat less than 200°, and frequently stirred, until it acquire a consistence proper for forming pills. This is made into little pastilles, or flat cakes, often bearing the impression of the places where they are made: and a bit now and then put into the mouth, takes off the tickling of a cough. It should be sucked to make it pleasant, as much of the juice at a time is unpleasant.

To prepare liquorice juice.

Take up the roots in July; clean them perfectly as soon as out of the earth, then hang them up in the air, till nearly dry; after this cut them into thin slices, and boil them in water till the decoction is extremely strong: then press it hard out to obtain all the juice from the roots. This decoction is left to settle a little, and when it has deposited its coarser parts, pour it off into vessels, evaporate it over a fire, strong first, but mild afterwards, till it becomes of a thick consistence; then let the fire go out, and when the extract is cool take out large parcels of it at a time, and work them well with the hands, forming them into cylindric masses, which cut into such lengths as required, roll them over half-dried bay leaves, which adhere to their surfaces, and leave them exposed to the sun, till perfectly dried. Great nicety is to be observed at the end of the evaporation, to get the extract to a proper consistence without letting it burn.

Refined liquorice.

That description of article which is vended in thin, rounded, and glazed pieces, about the thickness of a crow's quill, is entirely prepared in this country. The whole process consists in evaporating the liquorice-ball anew, and purifying it by rest, with the help of isinglass, &c.

To candy orange marmalade.

Cut the clearest Seville oranges into two, take out all the juice and pulp into a basin, and pick all the skins and seeds out of it. Boil the rinds in hard water till they become tender, and change the water two or three times while they are boiling. Then pound them in a marble mortar, and add to it the juice and pulp; put them next into a preserving pan with double their weight in loaf sugar, and set it over a slow fire. Boil it rather more than half an hour, put it into pots; cover it with brandy paper, and tie it close down.

To make transparent marmalade.

Cut very pale Seville oranges into quarters; take out the pulp, put into a basin, and pick out the skins and seeds. Put the peels into a little salt and water, and let them stand all night, then boil them in a good quantity of spring water until they are tender; cut them in very thin slices, and put them into the pulp. To every pound of marmalade put one pound and a half of double refined beaten sugar; boil them together gently for 20 minutes; if they are not transparent, boil them a few minutes longer. Stir it gently all the time, and take care not to break the slices. When it is cold, put it into jelly and sweetmeat glasses tied down tight.

Barberry marmalade.

Mash the barberries in a little water, on a warm stove; pass them through a hair sieve with a paddle; weigh the pulp and put it back on the fire; reduce it to one half, clarify a pound of sugar and boil it well; put in the pulp, and boil it together for a few minutes.

Quince marmalade.

Take quinces that are quite ripe, pare and cut them in quarters, take out the cores, put them in a stew-pan with spring water, nearly enough to cover them, keep them closely covered and let them stew gently till they are quite soft and red, then mash and rub them through a hair sieve. Put them in a pan over a gentle fire, with as much thick clarified sugar as the weight of the quinces; boil them an hour and stir the whole time with a wooden spoon to prevent its sticking: put it into pots and when cold tie them down.

To make Scotch marmalade.

Take of the juice of Seville oranges, 2 pints, —yellow honey, 2 lbs. Boil to a proper consistence.

To make hartshorn jelly.

Boil half a pound of hartshorn in three quarts of water over a gentle fire till it become a jelly; when a little hangs on a spoon it is done enough. Strain it hot, put it into a well tinned saucepan, and add to it half a pint of Rhenish wine, and a quarter of a pound of loaf sugar. Beat the whites of four eggs or more to a froth, stir it sufficiently for the whites to mix well with the jelly, and pour it in as if cooling it. Boil it two or three minutes, then put in the juice of four lemons and let it boil two minutes longer. When it is finely curdled and of a pure white, pour it into a swan-skin jelly bag over a China basin, and pour it back again until it becomes as clear as rock-water; set a very clean China basin under, fill the glasses, put some thin lemon rind into the basin, and when the jelly is all run out of the bag, with a clean spoon fill the rest of the glasses, and they will look of a fine amber colour. Put in lemon and sugar agreeable to the palate.

To make whipt cream.

Mix the whites of eight eggs, a quart of thick cream, and half a pint of sack, sweeten them to the taste with double refined sugar. It may be perfumed with a little musk or ambergris tied in a rag and steeped in a little cream. Whip it up with a whisk, and some lemon-peel tied in the middle of the whisk. Then lay the froth with a spoon in the glasses, or basins.

To make pistachio cream.

Beat half a pound of pistachio nut kernels in a mortar with a spoonful of brandy. Put them into a pan with a pint of good cream and the yolks of two eggs beaten fine. Stir it gently over the fire till it grows thick, and then put it into a China soup plate. When it is cold stick it over with small pieces of the nuts, and send it to table.

To make ice cream.

To a pound of any preserved fruit add a quart of good cream, squeeze the juice of two lemons into it and some sugar to taste. Let the whole be rubbed through a fine hair sieve, and if raspberry, strawberry, or any red fruit, add a little cochineal to heighten the colour; have the freezing pot nice and clean; put the cream into it and cover it; then put it into the tub with ice beat small, and some salt; turn the freezing pot quick, and as the cream sticks to the sides, scrape it down with an ice spoon, and so on till it is frozen. The more the cream is worked to the side with the spoon, the smoother and better flavoured it will be. After it is well frozen, take it out and put it into ice shapes with salt and ice; then carefully wash the shapes for fear of any salt adhering to them; dip them in lukewarm water and send them to table.

Another method.—Bruise two pottles of strawberries in a basin with half a pint of good cream, a little currant jelly, and some cold clarified sugar; rub this well through the tammy, and put it in an ice pot well covered; then set it in a tub of broken ice with plenty of salt; when it grows thick about the sides, stir it with a spoon, and cover it close again till it is perfectly frozen through; cover it well with ice and salt both under and over, and when it is frozen change it into a mould and cover well with ice. Sweeten a little plain cream with sugar and orange flower water, and treat it the same; likewise any other fruit, without cream, may be mixed as above. This is called *water ice.*

To make currant jelly.

Take the juice of red currants, 1 lb. sugar, 6 oz. Boil down.

Another method.—Take the juice of red currants, add white sugar, equal quantities.

Stir it gently and smoothly for three hours, put it into glasses, and in three days it will concrete into a firm jelly.

Black currant jelly.

Put to ten quarts of ripe dry black currants, one quart of water; put them in a large stewpot, tie paper close over them, and set them for two hours in a cool oven. Squeeze them through a fine cloth, and add to every quart of juice a pound and a half of loaf sugar broken into small pieces. Stir it till the sugar is melted, when it boils, skim it quite clean. Boil it pretty quick over a clear fire, till it jellies, which is known by dipping a skimmer into the jelly and holding it in the air; when it hangs to the spoon in a drop, it is done. If the jelly is boiled too long, it will lose its flavour and shrink very much. Pour it into pots, cover them with brandy papers, and keep them in a dry place. Red and white jellies are made in the same way.

Apple jelly.

Take of apple juice strained, 4 lbs. sugar, 1 lb. Boil to a jelly.

Strawberry jelly.

Take of the juice of strawberries, 4 lbs. sugar, 2 lbs. Boil down.

Gooseberry jelly.

Dissolve sugar in about half its weight of water, and boil: it will be nearly solid when cold; to this syrup add an equal weight of gooseberry juice, and give it a boil, but not long, for otherwise it will not fix.

Raspberry cream.

Rub a quart of raspberries through a hair sieve, and take out the seeds, and mix it well with cream; sweeten it with sugar to your taste, then put it into a stone jug, and raise a froth with a chocolate mill. As the froth rises, take it off with a spoon, and lay it upon a hair sieve. When there is as much froth as wanted, put what cream remains in a deep China dish, and pour the frothed cream upon it, as high as it will lie on.

Raspberry jam.

Mash a quantity of fine ripe dry raspberries, strew on them their own weight of loaf sugar, and half their weight of white currant juice. Boil them half an hour over a clear slow fire, skim them well, and put them into pots or glasses; tie them down with brandy papers, and keep them dry. Strew on the sugar as quick as possible after the berries are gathered, and in order to preserve their flavour they must not stand long before boiling them.

Strawberry jam.

Bruise very fine some scarlet strawberries, gathered when quite ripe, and put to them a little juice of red currants. Beat and sift their weight in sugar, strew it over them, and put them into a preserving pan. Set them over a clear slow fire, skim them, then boil them 20 minutes, and put them into glasses.

To make raspberry paste.

Mash a quart of raspberries, strain one half and put the juice to the other half; boil them a quarter of an hour, put to them a pint of red currant juice, and let them boil all together, till the raspberries are done enough. Then put 1 1-2 lbs. of double refined sugar into a clean pan, with as much water as will dissolve it; boil it to a sugar again; then put in the raspberries and juice, scald and pour them into glasses. Put then into a stove to dry, and turn them when necessary.

To make damson cheese.

Boil the fruit in a sufficient quantity of water to cover it; strain the pulp through a very coarse sieve; to each lb. add 4 oz. of sugar. Boil it till it begins to candy on the sides, then pour it into tin moulds. Other kinds of plums may be treated in the same way, as also cherries, and several kinds of fruit.

An omelette souffle.

Put 2 oz. of the powder of chesnuts into a skillet, then add 2 yolks of new laid eggs, and dilute the whole with a little cream, or even a little water; when this is done, and the ingredients well mixed, leaving no lumps, add a bit of the fresh butter, about the size of an egg, and an equal quantity of powdered sugar; then put the skillet on the fire, and keep stirring the contents; when the cream is fixed and thick enough to adhere to the spoon, let it bubble up once or twice, and take it from the fire; then add a third white of an egg to those you have already set aside, and whip them to the consistency of snow; then amalgamate the whipped whites of eggs and the cream, stirring them with a light and equal hand, pour the contents into a deep dish, sift over with double refined sugar, and place the dish on a stove with a fire over it as well as under, and in a quarter of an hour the cream will rise like an *omelette souffle;* as soon as it rises about 4 inches, it is fit to serve up.

To make orgeat paste.

Blanch and pound three quarters of a pound of sweet, and a quarter of a lb. of bitter almonds; pound them in a mortar, and wet them sufficiently with orange flower water, that they may not oil. When they are pounded fine, add three quarters of a pound of fine powdered sugar to them, and mix the whole in a stiff paste, which put into pots for use. It will keep six months; when wanted to be used, take a piece about the size of an egg, and mix it with half a pint of water and squeeze it through a napkin.

Pate de Guimauve.

Take of decoction of marshmallow roots, 4 oz. water, 1 gallon. Boil 4 pints and strain; then add gum arabic, 1-2 a lb. refined sugar, 2 lbs. Evaporate to an extract, then take from the fire, stir it quickly with the whites of 12 eggs, previously beaten to a froth; then add, while stirring, 1-2 oz. of orange-flower water.

Another.—Take of very white gum arabic, and white sugar, each 2 1-4 lbs. with a sufficient quantity of boiling water. Dissolve, strain, and evaporate without boiling, to the consistence of honey: beat up the white of six eggs with four drachms of orange-flower water, which mix gradually with the paste, and evaporate over a slow fire, stirring it continually till it will not stick to the fingers; it should be very light, spongy, and extremely white.

Pate de jujubes.

Take of raisins stoned, 1 lb.—currants picked, jujubes, opened, each 4 oz.—water, a sufficient quantity. Boil; strain with expression, add sugar, 2 1-2 lbs. gum arabic previously made into a mucilage with some water, and strain; evaporate gently, pour into moulds, finish by drying in a stove, and then divide it.

PICKLING.

This branch of domestic economy comprises a great variety of articles, which are essentially necessary to the convenience of families. It is at the same time too prevalent a practice to make use of brass utensils to give pickle a fine colour. This pernicious custom is easily avoided by heating the liquor and keeping it in a proper degree of warmth before it is poured upon the pickle. Stone jars are the best adapted for sound keeping. Pickles should never be handled with the fingers, but by a spoon kept for the purpose.

To pickle onions.

Put a sufficient quantity into salt and water for nine days, observing to change the water every day; next put them into jars and pour fresh boiling salt and water over them, cover them up close till they are cold, then make a second decoction of salt and water, and pour it on boiling. When it is cold, drain the onions on a hair sieve, and put them into wide-mouthed bottles; fill them up with distilled vinegar; put into every bottle a slice or two of ginger, a blade of mace, and a tea-spoonful of sweet oil; which will keep the onions white. Cork them well up in a dry place.

To make saur kraut.

Take a large strong wooden vessel, or cask, resembling a salt-beef cask, and capable of containing as much as is sufficient for the winter's consumption of a family. Gradually break down or chop the cabbages (deprived of outside green leaves,) into very small pieces; begin with one or two cabbages at the bottom of the cask, and add others at intervals, pressing them by means of a wooden spade against the side of the cask, until it is full. Then place a heavy weight upon the top of it, and allow it to stand near to a warm place, for four or five days By this time it will have undergone fermentation, and be ready for use. Whilst the cabbages are passing through the process of fermentation, a very disagreeable, fetid, acid smell is exhaled from them; now remove the cask to a cool situation, and keep it always covered up. Strew aniseeds among the layers of the cabbages during its preparation, which communicates a peculiar flavour to the saur kraut at an after period.

In boiling it for the table, two hours are the period for it to be on the fire. It forms an excellent nutritious and antiscorbutic food for winter use.

To make peccalilli: Indian method.

This consists of all kinds of pickles mixed and put into one large jar—girkins, sliced cucumbers, button onions, cauliflowers, broken in pieces. Salt them, or put them in a large hair sieve in the sun to dry for three days, then scald them in vinegar a few minutes; when cold put them together. Cut a large white cabbage in quarters, with the outside leaves taken off and cut fine, salt it, and put it in the sun to dry for three or four days; then scald it in vinegar, the same as cauliflower, carrots three parts boiled in vinegar and a little bay salt. French beans, rack samphire, reddish pods, and masturchions, all go through the same process as girkins, capsicums, &c. To one gallon of vinegar put four ounces of ginger bruised, two ounces of whole white pepper, two ounces of allspice, half an ounce of chillies bruised, four ounces of turmeric, one pound of the best mustard, half a pound of shalots, one ounce of garlic, and half a pound of bay salt. The vinegar, spice, and other ingredients, except the mustard, must boil half an hour; then strain it into a pan, put the mustard into a large basin, with a little vinegar; mix it quite fine and free from lumps, then add more; when well mixed put it to the vinegar just strained off, and when quite cold put the pickles into a large pan, and the liquor over them; stir them repeatedly so as to mix them all; finally, put them into a jar, and tie them over first with a bladder, and afterwards with leather. The capsicums want no preparation.

To pickle samphire.

Put what quantity wanted into a clean pan, throw over it two or three handsful of salt, and cover it with spring water for twenty-four hours; next put it into a clean saucepan, throw in a handful of salt, and cover it with good vinegar. Close the pan tight, set it over a slow fire, and let it stand till the samphire is green and crisp; then take it off instantly, for should it remain till it is soft, it well be totally spoiled. Put it into the pickling pot and cover it close, when it is quite cold tie it down with a bladder and leather, and set it by for use. Samphire may be preserved all the year by keeping it in a very strong brine of salt and water, and just before using it put it for a few minutes into some of the best vinegar.

To pickle mushrooms.

Put the smallest that can be got into spring water, and rub them with a piece of new flannel dipt in salt. Throw them into cold water as they are cleaned, which will make them keep their colour: next put them into a saucepan with a handful of salt upon them. Cover them close, and set them over the fire four or five minutes, or till the heat draws the liquor from them; next lay them betwixt two dry cloths till they are cold; put them into glass bottles and fill them up with distilled vinegar, with a blade of mace and a tea-spoonful of sweet oil into every bottle; cork them up close and set them in a dry cool place; as a substitute for distilled vinegar, use white wine vinegar, or ale. Allegar will do, but it must be boiled with a little mace, salt, and a few slices of ginger, and it must be quite cold before it is poured upon the mushrooms.

Another method.—Bruise a quantity of well grown flaps of mushrooms with the hands, and then strew a fair proportion of salt over them; let them stand all night, and the next day put them into stewpans; set them in a quick oven for 12 hours, and strain them through a hair sieve. To every gallon of liquor put of cloves, Jamaica black pepper, and ginger, one ounce each, 1-2 a lb. of common salt; set it on a slow fire, and let it boil till half the liquor is wasted; then put it into a clean pot, and when cold bottle it for use.

To pickle cucumbers.

Let them be as free from spots as possible; take the smallest that can be got, put them into strong salt and water for nine days, till they become yellow; stir them at least twice a day; should they become perfectly yellow, pour the water off and cover them with plenty of vine leaves. Set the water over the fire, and when it boils, pour it over them, and set them upon the earth to keep warm. When the water is almost cold make it boil again, and pour it upon them; proceed thus till they are of a fine green, which they will be in four or five times; keep them well covered with vine leaves, with a cloth and dish over the top to keep in the stream, which will help to green them.

When they are greened put them in a hair sieve to drain, and then to every two quarts of white wine vinegar put half an ounce of mace, ten or twelve cloves, an ounce of ginger, cut into slices, an ounce of black pepper, and a handful of salt. Boil them all together, for five minutes; pour it hot on the pickles, and tie them down for use. They may also be pickled with ale, ale vinegar, or distilled vinegar, and adding three or four cloves of garlic and shalots.

To pickle walnuts white.

Pare green walnuts very thin till the white appears, then throw them into spring water with a handful of salt, keep them under water six hours, then put them into a stew-pan to simmer five minutes, but do not let them boil; take them out and put them in cold water and salt; they must be kept quite under the water with a board, otherwise they will not pickle white, then lay them on a cloth and cover them with another to dry; carefully rub them with a soft cloth, and put them into the jar, with some blades of mace and nutmeg sliced thin. Mix the spice between the nuts and pour distilled vinegar over them; when the jar is full of nuts pour mutton fat over them, and tie them close down with a bladder and leather to keep out the air.

To pickle artificial anchovies.

To a peck of sprats put two pounds of salt, three ounces of bay salt, one pound of salt-petre, two ounces of prunella, and a few grains of cochineal; pound all in a mortar, put into a stone-pan first a layer of sprats, and then one of the compound, and so on alternately to the top. Press them down hard; cover them close for six months, and they will be fit for use, and will really produce a most excellent flavoured sauce.

To pickle salmon.

Boil the fish gently till done, and then take it up, strain the liquor, add bay leaves, pepper corns, and salt; give these a boil, and when cold add the best vinegar to them; then put the whole sufficiently over the fish to cover it, and let it remain a month at least.

To preserve fish by sugar.

Fish may be preserved in a dry state, and perfectly fresh, by means of sugar alone, and even with a very small quantity of it.

Fresh fish may be kept in that state for some days, so as to be as good when boiled as if just caught. If dried, and kept free from mouldiness, there seems no limit to their preservation; and they are much better in this way than when salted. The sugar gives no disagreeable taste.

This process is particularly valuable in making what is called kippered salmon; and the fish preserved in this manner are far superior in quality and flavour to those which are salted or smoked. If desired, as much salt may be used as to give the taste that may be required; but this substance does not conduce to their preservation.

In the preparation it is barely necessary to open the fish, and to apply the sugar to the muscular parts, placing it in a horizontal position for 2 or 3 days, that this substance may penetrate. After this it may be dried; and it is only further necessary to wipe and ventilate it occasionally, to prevent mouldiness.

A table spoonful of brown sugar is sufficient in this manner for a salmon of 5 or 6 pounds weight; and if salt is desired, a tea-spoonful or more may be added. Saltpetre may be used instead, in the same proportion, if it is desired to make the kipper hard.

To salt hams.

For three hams pound and mix together, half a peck of salt, half an ounce of salt prunella, three ounces of salt-petre, and four pounds of coarse salt; rub the hams well with this, and lay what is to spare over them, let them lie three days, then hang them up. Take the pickle in which the hams were, put water enough to cover the hams with more common salt, till it will bear an egg, then boil and skim it well, put it in the salting tub, and the next morning put in the hams; keep them down the same as pickled pork; in a fortnight take them out of the liquor, rub them well with brine, and hang them up to dry.

To dry salt beef and pork.

Lay the meat on a table or in a tub with a double bottom, that the brine may drain off as fast as it forms, rub the salt well in, and be careful to apply it to every niche; afterwards put it into either of the above utensils, when it must be frequently turned; after the brine has ceased running, it must be quite buried in salt, and kept closely packed. Meat which has had the bones taken out is the best for salting. In some places the salted meat is pressed by heavy weights or a screw, to extract the moisture sooner.

To pickle in brine.

A good brine is made of bay salt and water, thoroughly saturated, so that some of the salt remains undissolved; into this brine the substances to be preserved are plunged, and kept covered with it. Among vegetables, French beans, artichokes, olives, and the different sorts of samphire, may be thus preserved, and among animals, herrings.

To salt by another method.—Mix brown sugar, bay salt, common salt, each 2 lbs. salt-petre 8 oz. water 2 gallons; this pickle gives meats a fine red colour, while the sugar renders them mild and of excellent flavour.— Large quantities are to be managed by the above proportions.

TO PRESERVE FRUITS.

Some rules are necessary to be observed in this branch of confectionary. In the first place, observe in making syrups that the sugar is well pounded and dissolved, before it is placed on the fire, otherwise their scum will not rise well, nor the fruit obtain its fine colour. When stone fruit is preserved, cover them with mutton suet rendered, to exclude the air, which is sure ruin to them. All wet sweetmeats must be kept dry and cool to preserve them from mouldiness and damp. Dip a piece of writing paper in brandy, lay it close to the sweetmeats, cover them tight with paper, and they will keep well for any length of time; but will inevitably spoil without these precautions.

Another method.—The fruit, if succulent, is first soaked for some hours in very hard water, or in a week alum water, to harden it, and then to be drained upon the fruit, either prepared or not; pour syrup, boiled to a candy height, and half cold, after some hours the syrup, weakened by the sauce of the fruit, is to be poured off, re-boiled, and poured on again; and this repeat several times. When the syrup is judged to be no longer weakened, the fruit is to be taken out of it, and well drained.

To bottle damsons.

Put damsons, before they are too ripe, into wide mouthed bottles, and cork them down tight; then put them into a moderately heated oven, and about three hours more will do them; observe that the oven is not too hot, otherwise it will make the fruit fly. All kinds of fruits that are bottled may be done in the same way, and they will keep two years; after they are done, they must be put away with the mouth downward, in a cool place, to keep them from fermenting.

To preserve barberries.

Set an equal quantity of barberries and sugar in a kettle of boiling water, till the sugar is melted, and the barberries quite soft; let them remain all night. Put them next day into a preserving pan, and boil them fiften minutes, then put them into jars, tie them close, and set them by for use.

To preserve grapes.

Take close bunches, whether white or red, not too ripe, and lay them in a jar. Put to them a quarter of a pound of sugar candy, and fill the jar with common brandy. Tie them up close with a bladder, and set them in a dry place.

To dry cherries.

Having stoned the desired quantity of morello cherries, put a pound and a quarter of fine sugar to every pound; beat and sift it over the cherries, and let them stand all night. Take them out of their sugar, and to every pound of sugar, put too spoonsful of water. Boil and skim it well, and then put in the cherries; boil the sugar over them, and next morning strain them, and to every pound of syrup put half a pound more sugar; boil it till it is a little thicker, then put in the cherries and let them boil gently. The next day strain them, put them in a stove, and turn them every dey till they are dry.

To clarify honey.

The best kind is clarified by merely melting it in a water bath, and taking off the scum; the middling kind, by dissolving it in water, adding the white of an egg to each pint of the solution; and boiling it down to its original consistence, skimming it from time to time. The inferior kind requires solution in water, boiling the solution with one pound of charcoal, to 24 lbs. of honey, adding, when an excess of acid is apprehended, a small quantity of chalk or oyster shell powder; next by straining it several times through flannel, and reducing the solution to its original consistence by evaporation.

To preserve candied orange flowers.

Free them from their cups, stamina, and pistils, put four ounces into one pound of sugar, boiled to a candy height, and poured on a slab, so as to be formed into cakes.

To preserve seeds in honey for vegetation.

Seeds of fruits, or thin stalk strips, may be preserved by being put into honey; and on being taken out, washed, and planted, they will vegetate kindly.

To preserve fruits in brandy or other spirits.

Gather plums, apricots, cherries, peaches, ond other juicy fruits, before they are perfectly ripe, and soak them for some hours in hard, or alum water, to make them firm; as the moistnre of the fruit weakens the spirit, it ought to be strong, therefore, add five ounces of sugar to each quart of spirit.

To preserve Seville oranges whole.

Cut a hole at the stem end of the oranges the size of sixpence, take out all the pulp, put the oranges into cold water, for two days, changing it twice a day; boil them rather more than an hour, but do not cover them, as it will spoil the colour; have ready a good syrup, into which put the oranges, and boil them till they look clear; then take out the seeds, skins, &c. from the pulp first taken out of the oranges, and add to it one of the whole oranges, previously boiled, with an equal weight of sugar to it and the pulp: boil this together till it looks clear, over a slow fire, and when cold fill the oranges with this marmalade, and put on the tops; cover them with syrup, and put brandy paper on the top of the jar. It is better to take out the inside at first, to preserve the fine flavour of the juice and pulp, which would be injured by boiling in the water.

To preserve cucumbers and melons.

Take large cucumbers, green, and free from seed, put them in a jar of strong salt and water, with vine leaves on the top, set them by the fire side till they are yellow; then wash and set them over a slow fire in alum and water, covered with vine leaves, let them boil till they become green; take them off, and let them stand in the liquor till cold: then quarter them, and take out the seed and pulp; put them in cold spring water, changing it twice a day for three days. Have ready a syrup made thus: to one pound of loaf sugar, half an ounce of ginger bruised, with as much water as will wet it; when it is quite free from scum, put in, when boiling, the rind of a lemon and juice; when quite cold, pour the syrup on the melons. If the syrup is too thin, after standing two or three days, boil it again, and add a little more sugar. A spoonful of rum gives it the West Indian flavour. Girkins may be done the same way. One ounce of alum, when pounded, is sufficient for a dozen melons of a middling size.

To preserve strawberries whole.

Take an equal weight of fruit and double refined sugar, lay the former in a large dish, and sprinkle half the sugar in fine powder; give a gentle shake to the dish, that the sugar may touch the under side of the fruit. Next day make a thin syrup with the remainder of the sugar; and allow one pint of red currant juice to every three pounds of strawberries; in this simmer them until sufficiently jellied. Choose the largest scarlets, not dead ripe.

To preserve apricots.

Infuse young apricots before their stones become hard, into a pan of cold spring water, with plenty of vine leaves, set them over a slow fire until they are quite yellow, then take them out, and rub them with a flannel and salt to take off the lint: put them into the pan to the same water and leaves, cover them close at a distance from the fire, until they are a fine light green, then pick out all the bad ones. Boil the best gently two or three times in a thin syrup, and let them be quite cold each time before you boil them. When they look plump and clear, make a syrup of double refined sugar, but not too thick; give your apricots a gentle boil in it, and then put them into the pots or glasses, dip a paper in brandy, lay it over them, tie them close, and keep them in a dry place.

To make candied angelica.

The stalks are to be boiled for a quarter of an hour in water, to take away their bitterness, and some of the strong scent; they are then to be put into syrup, boiled to a full candied height, and kept on the fire until they appear quite dry, and then taken out and drained.

Candied eringo

Is prepared nearly in the same manner as candied angelica, but the roots are only slit, and washed three or four times in cold water, before they are put into the syrup.

To keep gooseberries.

Put an ounce of roche alum beat very fine, into a large pan of boiling hard water; place a few gooseberries at the bottom of a hair sieve, and hold them in the water till they turn white. Then take out the sieve, and spread the gooseberries between two cloths; put more into the sieve, then repeat it till they are all done: Put the water into a glazed pot until the next day, then put the gooseberries into wide-mouthed bottles, pick out all the cracked and broken ones, pour the water clear out of the pot, and fill the bottles with it, cork them loosely and let them stand a fortnight. If they rise to the corks, draw them out and let them stand two or three days uncorked, then cork them close again.

PERFUMERY AND COSMETICS.

To make eau de Cologne.

Take of essence de bergamot, 3 oz. neroli, 1 1-2 drachms, cedrat, 2 do. lemon, 3 do. oil of rosemary, 1 do. spirit of wine, 12 lbs. spirit of rosemary, 3 1-2 do. eau de melisse de Carmes, 2 1-4 do. Mix. Distil in *balneum mariæ*, and keep it in a cold cellar or icehouse for some time. It is used as a cosmetic, and made with sugar into a ratafia.

To make eau de melisse de Carmes.

Take of dried balm leaves, 4 oz. dried lemon peel, 2 do. nutmegs and coriander seeds, each, 1 oz. cloves, cinnamon, and dried angelica roots, each, 4 dr. spirit of wine, 2 lbs, brandy, 2 do. Steep and distil in *balneum mariæ*, redistil, and keep for some time in a cold cellar.

Original receipt for the same.—Take of spirit of balm, 8 pints, lemon peel, 4 do. nutmegs and coriander seeds, each 2 do. rosemary, marjoram, thyme, hyssop, cinnamon, sage, aniseed, cloves, angelica roots, each 1 pint. Mix, distil, and keep it for a year in an icehouse.

This is the original receipt of the bare footed Carmelites, now in possession of the company of apothecaries of Paris, who sell a vast quantity of this celebrated water.

To make eau de boquet.

Take of sweet scented honey water, 1 oz. eau sans pareille, 1 1-2 do. essence de jasmin, 5 drachms, syrup of cloves and spirit of violets, each, 4 drachms, calamus aromaticus, long rooted cyperus, lavender, each, 2 do. essence of neroli, 1 scruple. Mix. Some add a few gr. of musk and ambergris: it is sweet scented, and also made into a ratafia with sugar.

To make essence de jasmin.

The flowers are stratified with wool or cotton, impregnated with oil of hehn, or nut oil, in an earthen vessel, closely covered, and kept for some time in a warm bath; this is repeated with fresh flowers, until the oil is well scented; the wool, &c. is then put into a sufficient quantity of spirit of wine, and distilled in *balneum mariæ*.

To make the best honey water.

Take of coriander seeds, a pound, cassia, 4 oz. cloves and gum benzoin, each, 2 oz. oil of rhodium, essence of lemon, essence of bergamot, and oil of lavender, each, 1 drachm, rectified spirit of wine, 20 pints, rose water, 2 quarts, nutmeg water, 1 quart, musk and ambergris, each, 12 grains. Distil in a water bath to dryness.

Another method.—Put 2 drachms each, of tincture of ambergris, and tincture of musk, in a quart of rectified spirit of wine, and half a pint of water: filter and put it up in small bottles.

To make ottar of roses.

The royal society of Edinburgh received from Dr. Monro the following account of the manner in which this costly perfume is prepared in the east. Steep a large quantity of the petals of the rose, freed from every extraneous matter, in pure water in an earthen or wooden vessel, which is exposed daily to the sun, and housed at night, till a scum rises to the surface. This is the *ottar*, which, carefully absorb by a very small piece of cotton tied to the end of a stick. The oil collected, squeeze out of the cotton into a very diminutive vial, stop it for use. The collection of it should be continued, whilst any scum is produced.

English milk of roses.

Take 2 lbs. of Jordan almonds, 5 quarts of rose water, 1 do. of rectified spirit of wine, 1-2 an oz. of oil of lavender, 2 oz. of Spanish oil soap, and 4 oz. of cream of roses.—Blanch the almonds in boiling water, dry them well in a cloth, then pound them in a mortar until they become a paste. Pound in the soap and mix it well with the almond paste. Then add the cream of roses. When these are mixed, add the rose-water and spirits, which stir in with a spatula or knife. Strain the whole through a clean white cloth, then add the oil of lavender to the expressed liquid, drop by drop, and stir the whole well. When the mixture has stood for a day, cover it over with a cloth from the dust, then bottle it for use.

French milk of roses.

Mix together 4 oz. of oil of almonds, 1-2 an oz. of English oil of lavender, 2 quarts of spirit of wine, and 10 do. of rose-water. Next blanch 3 lbs. of Jordan almonds, and pound them in a mortar, with a quarter of a pound of Spanish oil-soap, half an ounce of spermaceti, and half an ounce of white wax. Put these ingredients into a large jar, with two ounces of pearl-ash, dissolved in an ounce of warm water. Shake the whole well and then pour it into small bottles for sale.

To make cream of roses.

Take 1 lb. of oil of sweet almonds, 1 oz. of spermaceti,—1 oz. of white wax, 1 pint of rose water, and 2 drachms of Malta rose, or nerolet essence. Put the oil, spermaceti, and wax, into a well glazed pipkin, over a clear fire, and, when melted, pour in the rose-water by degrees, and keep heating, till the compound becomes like pomatum. Now add the essence, and then put the cream into small pots or jars, which must be well covered up with pieces of bladder, and soft skin leather.

To make cold cream pomatum for the complexion.

Take an ounce of oil of sweet almonds, and half a drachm each, of white wax and spermaceti, with a little balm. Melt these ingredients in a glazed pipkin, over hot ashes, and pour the solution into a marble mortar; stir it with the pestle until it becomes smooth and cold, then add gradually an ounce of rose or orange-flower water; stir all the mixture till incorporated to resemble cream. This pomatum renders the skin at once supple and smooth. To prevent marks from the small pox, add a little powder of saffron. The gallipot in which it is kept, should have a piece of bladder tied over it.

Another.—Take 4 ounces of clear trotter oil, one ounce of oil of jessamine, 2 ounces of spermaceti, and one ounce of white wax, scraped fine. Melt them together very gently, then pour it into a pan, which must be kept by the fire. Now beat it without intermission, till it becomes one consistent very white body: then put to it 3 ounces of rose or orange-flower water, with about a drachm of spirit of ambergris, or other sweet essence. Beat the mixture well again, until the water and spirit be properly absorbed. This beating will add greatly to the whiteness as well as the flavour of the cream, which will now be as white as snow; particularly if care is taken that the utensils and ingredients are quite clean.

In winter, all the utensils, &c. must be kept warm, and the process performed in a warm room. Even the rose-water must be warmed, previous to mixture, otherwise the cream will congeal into knobs, so as to cause the whole to be melted again.

In summer every thing must be kept cool after the melting and mixing. More wax must likewise be used in summer than in winter.

When put into pots, the cold cream is to be kept very cool; each having honey water poured on the top, in order to improve the flavour.

To make pomade divine.

Put a pound and a half of clear beef marrow into an earthen pan of fresh water, and change the same for ten days, then steep it in rose water for 24 hours, and drain it in a cloth till dry. Take an ounce of storax, gum benjamin, odoriferous Cypress powder, or of Florence, half an ounce of cinnamon, two drachms of cloves, and two drachms of nutmeg, all finely powdered: mix them with the marrow, then put the ingredients into a three-pint pewter pot, make a paste of the white of egg and flour, and lay it upon a piece of rag, over that, put another piece of linen to cover the top close. Put the pot into a large copper pot with water, and keep it steady that it may not reach to the covering of the pot that holds the marrow. As the water shrinks, add more, for it must boil four hours without ceasing; strain the ointment through a linen cloth into small pots, and when cold cover them up close with bladder and paper. Don't touch it with any thing but silver.

Pearl water for the face.

Put half a pound of best Spanish oil soap, scraped very fine, into a gallon of boiling water. Stir it well for some time, and let it stand till cold. Add a quart of rectified spirit of wine, and half an ounce of oil of rosemary; stir them again. This compound liquid, when put up in proper phials, in Italy, is called *tincture of pearls.* It is an excellent cosmetic for removing freckles from the face, and for improving the complexion.

To prepare almond bloom.

Take of Brazil dust, 1 oz. water, 3 pints, isinglass, 6 drachms, cochineal, 2 do. alum, 1 oz. borax, 3 drachms.

To make almond paste.

Take of blanched sweet almonds, 1 lb. blanched bitter do. 1-2 lb. sugar, 1 lb. Beat up with orange flower water.

Common almond paste.

To make this paste, take six pounds of fresh almonds, which blanch and beat in a stone mortar, with a sufficient quantity of rose water. Now add a pound of finely drained honey, and mix the whole well together. This paste, which is exceedingly good for the hands, is to be put into small pots for sale. If this paste gets dry, rub it up on a marble slab with rose-water. To prevent this dryness, put about half a teaspoonful of this water on the top of each pot, before tying up.

Orange pomatum.

Take 5 pounds of hog's lard, 1 pound of mutton suet, 3 ounces of Portugal water, half an ounce of essence of Bergamot, 4 ounces of yellow wax, and half a pound of palm oil. Mix.

Soft pomatum.

Take 25 pounds of hog's lard, 8 pounds of mutton suet, 6 ounces of oil of Bergamot, 4 ounces of essence of lemons, half an ounce of oil of lavender, and 1-4 of an ounce of oil of rosemary. These ingredients are to be combined in the same manner as those for the hard pomatum. This pomatum is to be put up in pots, in the usual way.

Common pomatum.

Take 4 pounds of fresh and white mutton suet skinned and shredded very fine; which melt in about two quarts of spring water; and whilst hot, put the whole into a well glazed earthen pan, small at bottom, and wide at the top. Let it stand until the fat is quite cold, and all the impurities fall to the bottom, which carefully scrape off. Now break the fat into small pieces, which put into a pan, with 2 gallons of spring water, for a whole day; stir and wash often. Next day change the water, and when poured off a second time, at the end of twenty-four hours, dry the fat by rubbing in a clean linen cloth. Now put the suet, with 1 pound and a half of fresh hog's lard, into a large pan, and melt the whole over a gentle fire. When properly combined, put the whole into an earthen pan, and beat it with a wooden spatula, until cold. Whilst beating, add 6 drachms of essence of lemon, and 30 drops of oil of cloves previously mixed together. Now continue beating, until the mixture be perfectly white, and afterwards put it up into small pots. Leave the pots open until the pomatum is quite cold; when cover them by pieces of bladder, &c. In summer, use more suet, and mix in a cool place:—in winter use more hog's lard, and make the pomatum in a warm room.

Hard pomatum.

Take 30 lbs. of suet, 1 1-2 lbs. of white wax, 6 ounces of essence of Bergamot, 4 ounces of lemon, 1 oz. of lavender, 4 drachms of oil of rosemary, and 2 drachms of essence of ambergris. Shred and pick the suet clean, and melt it in an earthen pan or pipkin. Then stir it well and strain; and when nearly cold, add the perfumes, stirring well as before. When properly mixed, pour it into tin moulds.

Another.—Take 6 oz. of common pomatum, and add to it 3 ounces of white virgin wax, scraped fine. Melt them in an earthen pan, immersed in a larger one containing boiling water; both being placed over a clear and steady fire. When properly incorporated, keep stirring, until it is nearly cold; then put it into small pots, or make it up into small rolls. Perfume it according to taste.

Rosemary pomatum.

Strip a large double handful of rosemary; boil it in a tin or copper vessel, with half a pound of common soft pomatum, till it comes to about 3 or 4 oz. strain it off, and keep it in the usual way.

Pearl powder for the face.

There are several sorts: the finest is made from *real pearls*, and is the least hurtful to the skin. It gives the most beautiful appearance, but is too dear for common use; still the perfumer ought never to be without it, for the use of the curious and the rich.

Bismuth pearl powder.

The next best pearl powder is made as follows: Take 4 ounces of the best magistery of bismuth, 2 ounces of fine starch powder. Mix them well together, and putting them into a subsiding glass, wide at top and narrow at bottom, pour over them a pint and a half of proof spirit, and shake them well; let them remain a day or two. When the powder falls to the bottom, pour off the spirit, leaving it dry; then place the glass in the sun, to evaporate the moisture. Next turn out the white mass, the dirty parts of which form the top, whilst the pure ingredients remain at the bottom. If there be any dirty particles, scrape them off, and again pulverize the remaining part of the cake, and pour more proof spirit over it. Proceed as before; and, if there be any moisture remaining, place the cone on a large piece of smooth chalk, to absorb its moisture. Cover the whole with a bell-glass to preserve it from dust, and set it in the sun to dry and whiten it. Next grind the mass with a muller on a marble stone; and keep the powder in a glass bottle, secured by a ground stopper, from air.

To blacken white oxide of bismuth by Harrowgate water.

Place a little oxide of bismuth on a white dish, and pour over it some Harrowgate water. Its beautiful white colour will be instantly changed to *black*.

It is well known that this oxide, under the name of *pearl white*, is used as a cosmetic by those of the fair sex who wish to become fairer. A lady thus painted was sitting in a lecture room, where chemistry being the subject, water being impregnated with sulphuretted hydrogen gas (Harrowgate water) was handed round for inspection. On smelling this liquid, the lady in question became suddenly *black in the face*. Every person was of course alarmed by this sudden *chemical* change; but the lecturer explaining the cause of the phenomenon, the lady received no further injury, than a salutary practical lesson to rely more upon natural than artificial beauty in future.

Orange flower paste for the hands.

Blanch 5 or 6 lbs. of bitter almonds, by boiling in water, and then beat them very fine in a marble mortar, with 2 lbs. of orange flowers. If the paste be too oily, add to it some bean flour, finely sifted, but let no water enter the composition. This paste is made abroad, but comes here very damaged, the sea-air destroying its properties.

To make coral tooth powder.

Take 4 oz. of coral, reduced to an impalpable powder, 8 oz. of very light Armenian bole, 1 oz. of Portugal snuff, 1 oz. of Havannah snuff, 1 oz. of good burnt tobacco ashes, and 1 oz of gum myrrh, well pulverized. Mix them together, and sift them twice.

A good tooth powder.

To make a good tooth powder leave out the coral; and, in its place, put in pieces of brown stone-ware, reduced to a very fine powder. This is the common way of making it.

An astringent for the teeth.

Take of fresh conserve of roses, 2 ounces, the juice of half a sour lemon, a little very rough claret, and 6 ounces of coral tooth-powder. Make them into a paste, which put up in small pots; and if it dry by standing, moisten with lemon juice and wine as before.

To prevent the tooth ache.

Rub well the teeth and gums with a hard tooth-brush, using the flowers of sulphur as a tooth powder, every night on going to bed; and if it is done after dinner it will be best: this is excellent preservative to the teeth, and void of any unpleasant smell.

A radical cure for the tooth-ache.

Use as a tooth powder the Spanish snuff called Sibella, and it will clean the teeth as well as any other powder, and totally prevent the tooth-ache; and make a regular practice of washing behind the ears with cold water every morning, the remedy is infallible.

To clean the teeth.

Take of good soft water, 1 quart, juice of lemon, 2 oz. burnt alum, 6 grains, common salt, 6 grains. Mix. Boil them a minute in a cup, then strain and bottle for use: rub the teeth with a small bit of sponge tied to a stick, once a week.

To make the teeth white.

A mixture of honey with the purest charcoal will prove an admirable cleanser.

To make an excellent opiate for the teeth.

Well boil and skim 1 lb. of honey; add to it a quarter of a pound of bole ammoniac, 1 ounce of dragon's blood, 1 of oil of sweet almonds, half an ounce of oil of cloves, 8 drops of essence of bergamot, a gill of honey water, all mixed well together, and put into pots for use.

To make vegetable tooth brushes.

Take marine marsh-mallow roots, cut them into lengths of 5 or 6 inches, and of the thickness of a middling rattan cane. Dry them in the shade, but not so as to make them shrivel.

Next finely pulverize two ounces of good dragon's blood, put it into a flat bottomed glazed pan, with four ounces of highly rectified spirit, and half an ounce of fresh conserve of roses. Set it over a gentle charcoal fire, and stir it until the dragon's blood is dissolved; then put in about thirty of the marsh-mallow sticks; stir them about, and carefully turn them, that all parts may absorb the dye alike. Continue this until the bottom of the pan be quite dry, and shake and stir it over the fire, until the sticks are perfectly dry and hard.

Both ends of each root or stick should, previous to immersion in the pan, be bruised gently by a hammer, for half an inch downwards, so as to open its fibres, and thereby form a brush.

They are generally used by dipping one of of the ends in the powder or opiate, and then, by rubbing them against the teeth, which they cleanse and whiten admirably.

Other vegetable tooth brushes.—There are several cheap sorts of these tooth-brushes, which are made in the same manner as the genuine ones except that, as a basis, rattan cane, or even common deal, cut round, is used instead of the marsh-mallow roots.

To make rose lip salve.

Put eight ounces of the best olive oil into a a wide-mouthed bottle, add two ounces of the small parts of alkanet-root. Stop up the bottle, and set it in the sun; shake it often, until it be of a beautiful crimson. Now strain the oil off very clear from the roots, and add to it, in a glazed pipkin, three ounces of very fine white wax, and the same quantity of fresh clean mutton suet. Deer suet is too brittle, and also apt to turn yellow. Melt this by a slow fire, and perfume it when taken off, with forty drops of oil of rhodium, or of lavender. When cold, put it into small gallipots, or rather whilst in a liquid state.

The common way is to make this salve up into small cakes; but in that form the colour is very apt to be impaired.

This salve never fails to cure chopped or sore lips, if applied pretty freely at bed-time, in the course of a day or two at farthest.

Another method.—Beat the alkanet root in a mortar, until its fibres are properly bruised, then tie it up in a piece of clean linen rag, and put this in a clean pipkin with the oil. When the oil has begun to boil, it will be found of a deep red. The bag is now to be taken out, pressed, and thrown away, and then the other ingredients are to be added, as above.

White lip salve.

This may be made as above, except in the use of alkanet root which is to be left out. Though called lip-salve, this composition is seldom applied to the lips; its principal use consisting in curing sore nipples, for which it is an excellent remedy.

To sweeten the breath.

Take two ounces of terra japonica; half an ounce of sugar-candy, both in powder. Grind one drachm of the best ambergris with ten grains of pure musk; and dissolve a quarter of an ounce of clean gum tragacanth in two ounces of orange-flower water. Mix all together, so as to form a paste, which roll into pieces of the thicknes of a straw. Cut these into pieces, and lay them in clean paper. This is an excellent perfume for those whose breath is disagreeable.

To perfume clothes.

Take of oven-dried best cloves, cedar and rhubarb wood, each one ounce, beat them to a powder, and sprinkle them in a box or chest, where they will create a most beautiful scent, and preserve the apparel against moths.

Perfumed bags for drawers.

Cut, slice, and mix well together, in the state of very gross powder, the following ingredients: 2 oz. of yellow saunders, 2 oz, of coriander seeds, 2 oz. of orris root, 2 oz. of calamus aromaticus, 2 oz of cloves, 2 oz. of cinnamon bark, 2 oz. of dried rose leaves, 2 oz. of lavender flowers, and 1 lb. of oak shavings. When properly mixed, stuff the above into small linen bags, which place in drawers, wardrobe, &c., which are musty, or liable to become so.

Excellent perfume for gloves.

Take of ambergris one drachm, civet the like quantity; add flour-butter a quarter of an ounce; and with these well mixed, rub the gloves over gently with fine cotton wool, and press the perfume into them.

Another.—Take of damask or rose scent, half an ounce, the spirit of cloves and mace, each a drachm; frankincense, a 1-4 of an ounce. Mix them together, and lay them in papers, and when hard, press the gloves; they will take the scent in 24 hours, and hardly ever lose it.

Tincture of musk.

This excellent spirit requires 6 drachms of China musk, 20 grains of civet, and two drachms of red rose buds. Reduce these ingredients to powder with loaf sugar, and pour over them 3 pints of spirit of wine.

A perfume to prevent pestilential airs, &c.

Take of benjamin, storax, and galbanum, each half an oz. temper them, being bruised into powder, with the oil of mirrh, and burn them in a chafing-dish, or else take rosemary, balm, and bay leaves; heat them in wine and sugar, and let the moisture be consumed; likewise burn them by the heat of the pan, and they will produce a very fine scent.

Pastils for perfuming sick rooms.

Powder separately the following ingredients, and then mix, on a marble slab, 1 lb. of gum benzoin, 8 oz. of gum storax, 1 lb. of frankincense, and 2 lbs. of fine charcoal. Add to this composition the following liquids: 6 oz. of tincture of benzoin, 2 oz. of essence of ambergris, 1 oz. of essence of musk, 2 oz. of almond oil, and 4 oz. of clear syrup. Mix the whole into a stiff paste, and form into pastils, of a conical shape, which dry in the heat of the sun. If more liquid should be required for the paste, add warm water.

Aromatic pastils.

Beat and sift fine a pound of the four gums left after the making of honey-water, one pound also of the ingredients left from the spirit of benjamin, one pound of the best sealing-wax, and one pound of genuine gum benzoin.

Dissolve some clear common gum arabic in a quantity of rose-water, of a pretty thick consistency, and add to it sixty drops of the spirit of musk.

Mix the whole together, so as to make a pretty stiff paste, which make up into small cones or balls. Dry them thoroughly before they are put away, otherwise they will become mouldy.

These pastils are particularly useful for burning in rooms, where the sick or the dead have lain. They are used in very considerable quantity in the two Houses of Lords and Common; also in various balls, assembly rooms, &c.

Explosive pastils.

There is another sort of these pastils, called *sweets and sours*, which are made thus: Take some of the above aromatic paste, and make into cones of 2 inches in length, and of the thickness, at their bases, of an inch. Whilst moist, scoop out a cavity in the bottom of each, capable of containing a large pea, fill it up with gunpowder, covering this over with the paste which has been scooped out.

When to be dried, lay the bottoms of these pastils uppermost; for if any moisture attacks the gunpowder, its effects will be destroyed.

The design (it can hardly be called a useful purpose,) for which these pastrils are made, is to produce diversion. During Christmas, or other holiday gambols, it is customary with many to light one of these with the avowed intention of perfuming the apartments, and whilst the company are pleased with the odour, an unexpected report terrifies some, whilst it amuses others.

Hair powder perfume.

Take half a pound of pulvil powder, made from apple-tree moss, half an ounce of grey ambergris, thirty grains of musk, and twenty grains of civit. Grind the musk and civet with loaf sugar to a very fine powder; melt the ambergris, with 6 drops of the oil of behn nuts, over a gentle fire, in a clean vessel, not brass or copper, add, as it melts, a few drops of the juice of green lemon, and about 4 drops each of oil of rhodium and lavender. When the ambergris is melted, put the above powder into it, stir and mix it well. Add, by degrees, the powder of apple-moss; and when the whole is combined, pulverize and sift it through a very fine hair sieve; what will not pass through, return into the mortar, again pound it with loaf sugar, until the whole is reduced to a fine powder.

Ambergris perfume.

Melt 2 penny-weights of fine ambergris, in a brass mortar, very gently, stir in quickly, 8 drops of green lemon juice, and the same of behn-nut oil. Add, ready powdered with fine loaf sugar, 12 grains of musk, 12 grains of civet, and 24 grains of the residuum from the making of spirit of ambergris. Add one ounce of spirit of ambergris, mix and incorporate them well, and add 16 pounds of fine dry hair powder. Pass the whole, twice through a fine hair sieve; then lay it open for three days, in a dry room, stir it often, that the spirit may entirely evaporate; otherwise it may turn sour, which however will go off by keeping. Bottle and stop it close.

Musk and civet perfumes.

Take 2 penny-weights of pure musk, 12 grains of civet, and 1 penny-weight of the residuum of spirit of ambergris. Make this into a paste, with 2 ounces of spirit of musk, made by infusion. Powder it with loaf-sugar and mix in 16 pounds of fine hair powder.

Orris perfume.

Take best dried and scraped orris roots, free from mould. Bruise or grind them: the latter is best, as, being very tough, they require great labour to pound. Sift the powder through a fine hair sieve, and put the remainder in a baker's oven, to dry the moisture. A violent heat will turn the roots yellow. When dry, grind again, and sift, and repeat the same until the whole has passed through the sieve; mix nothing with it, as it would mould and spoil it.

Violet perfume.

Drop twelve drops of genuine oil of rhodium on a lump of loaf-sugar; grind this well in a glass mortar, and mix it thoroughly with three pounds of orris powder. This will, in its perfume, have a resemblance to a well-flavoured violet. If you add more rhodium oil, a rose perfume, instead of a violet one, will be produced; the orris-powder is a most agreeable perfume, and only requiring to be raised by the addition of the above quantity of the oil. Keep this perfume in the same manner as the others. What is at the druggists' shops is generally adulterated.

Rose perfume.

Take two pecks of fresh dry damask rose leaves; strip them from their leaves and stalks; have ready sixteen pounds of fine hair-powder. Strew a layer of rose leaves, on sheets of paper, at the bottom of a box, cover them over with a layer of hair-powder; then strew alternately a layer of roses and powder, until the whole of each has been used. When they have lain 24 hours, sift the powder out, and expose it to the air 24 hours more. Stir it often. Add fresh rose-leaves, twice, as before, and proceed in the same way; after this dry the powder well by a gentle heat, and pass it through a fine sieve. Lastly, pour ten drops of the oil of rhodium, or three drops of otto of roses, on loaf sugar, which triturate in a glass mortar, and stir well into the powder, which put into a box, or glass for use. This hair-powder perfume will be excellent, and will keep well.

Bergamot perfume.

Take sixteen pounds of hair-powder, and forty drops of Roman oil of Bergamot, and proceed in all respects as before, but do not leave the compound exposed to the air; for in this case the bergamot is so volatile, that it will quickly fly off.

To make ambergris hair-powder.

Take twelve pounds of fine starch-powder, add three pounds of the ambergris perfume; mix them well together, and run it twice through a fine hair sieve. Put it into a well closed box, or glass, for use. This is the first and best sort of ambergris powder: but for a second, or inferior sort, put only a pound and a half of the perfume, to the above quantity of starch-powder.

Musk and civet hair-powder.

Mix twelve pounds of starch-powder, and three pounds of musk perfume, as before. A second sort of this hair-powder may be made by using half the quantity of the perfume.

Violet hair-powder.

Mix twelve pounds of hair-powder with three pounds of the violet perfume, and lay it by for use.

Rose hair-powder.

Mix well twelve pounds of starch-powder, with three pounds of the rose perfume. Sift; put it up in a cedar box, or glass bottle.

Another.

A second sort of this powder may be made by using half the quantity of the perfume, to twelve pounds of powder, and adding two drops of otto of roses, previously dropped on sugar, and well triturated in a glass mortar.

To destroy superfluous hair.

Take of fresh lime-stone, 1 oz. pure potass, 1 drachm, sulphuret of potass, 1 drachm. Reduce them to a fine powder in a wedgwood mortar. If the hair be first washed, or soaked in warm water, (130 Fahr.) for ten minutes, this article formed into a thin paste, with *warm* water, and applied whilst warm, will so effectually destroy the hair in five or six minutes, that it may be removed by washing the skin with flannel. It is a powerful caustic, and should therefore be removed as soon as it begins to inflame the skin by washing it off with vinegar. It softens the skin, and greatly improves its appearance.

To make Spanish ladies' rouge.

Take good new scarlet wool cuttings and spirit of wine, or lemon-juice, boil them in a well-glazed earthen pot well stopped, till the liquid has charged itself with all the colour of the scarlet, strain the dye through a cloth, and all the colour therefrom; boil it afterwards in a little arabic water, till the colour becomes very deep. The proportion of materials is, to half a pound of scarlet cuttings, a quarter of a pint of spirit of wine, and a sufficient quantity of water to assist the soaking. Then, in the colour extracted, put a piece of gum arabic, of the size of a filbert: next steep some cotton in the colour, and wet some sheets of paper with the dye, which repeat several times, as often as they are dry, and you will find them sufficiently charged with rouge for use.

Spanish vermilion for the toilette.

Pour into the alkaline liquor which holds in solution the colouring part of bastard saffron, such a quantity of lemon-juice as may be necessary to saturate the whole alkaline salts. At the time of the precipitation, the latter appears under the form of a fecula full of threads, which soon falls to the bottom of the vessel. Mix this part with white talc, reduced to fine powder, and moistened with a little lemon-juice and water. Then form the whole into a paste; and having put it in small pots, expose it to dry. This colour is reserved for the use of the toilette; but it has not the durability of that prepared from cochineal.

Economical Rouge.

Fine carmine, properly pulverized and prepared for the purpose, is the best that can be employed with safety and effect; it gives the most natural tone to the complexion, and imparts a brilliancy to the eyes, without detracting from the softness of the skin. To use it economically, take some of the finest pomatum, without scent, in which there is a proportion of white wax, about the size of a pea, just flatten it upon a piece of white paper, then take on a pointed pen-knife, carmine equal to a pin's head, mix it gently with the pomatum, with your finger, and when you have produced the desired tint, rub it in a little compressed cotton, pass it over the cheeks till colour is clearly diffused, void of grease. Ladies will find upon trial, that this economical rouge will neither injure the health nor the skin; and it imitates perfectly the natural colour of the complexion.

Another.—Take of French chalk (powdered) 4 ounces; oil of almonds, 2 drachms; carmine, 1 do.

Turkish bloom.

Infuse 1 1-2 ounces of gum benzoin, 2 ounces of red saunders in powder, and 2 drachms of dragon's blood, in 12 ounces of rectified spirit of wine, and 4 ounces of river or rain water. When the ingredients have been mixed, stop the bottle close, and shake frequently during seven days; then filter through blotting paper.

A wash for sun-burnt faces and hands.

To each pound of ox-gall, add roche alum, 1 drachm, rock salt, 1-2 ounce, sugar candy, 1 ounce, borax, 2 drachms, camphor, 1 drachm. Mix and shake well for fifteen minutes, then often daily, for fifteen days, or till the gall is transparent; filter through cap paper; used when exposed to the sun; always washing off before sleep.

Macouba snuff.

The varied flavour of snuffs of different kinds arises less from the state of the original leaf, than the factitious additions of manufacturers. The snuff of Martinico celebrated under the term "Macouba," is made from the best leaves, which being moistened with juice from their excellent sugar-canes, undergoes fermentation, and having thrown off the offensive *fetor* in scum and residuum, is evaporated and ground in the usual manner.

Cephalic snuff.

Its basis is powdered *asarum*, (vulgo Asarabacca,) reduced by admixture with a small portion of powdered *dock-leaf*, or any other innoxious vegetable. The finely levigated snuff, known as "Scotch" may be added agreeable to the taste of the consumer; and finally a solution of spirit of wine and camphor, in the proportion of one drachm of the latter, in fifteen of spirit, is to be dropped upon the camphor, from five to ten drops to an ounce. Bottle your snuff immediately.

Another may be made of a very pleasant flavour, with the powder produced from sage, rosemary, lilies of the valley, and tops of sweet majoram, of each 1 ounce, with a drachm of Asarabacca root, lavender-flowers, and nutmeg; it should be very fine, and it will relieve the head vastly.

To imitate Spanish snuff.

Take good unsifted Havanna snuff, and grind it down to a fine powder. If the tobacco be too strong, mix it with the fine powder of Spanish nut-shells, which is by far the best mixture which can be used. Over this sprinkle some weak treacle water, and when, after mixing with the hands, it has lain in a heap for some days, to sweat and incorporate, pack it up; but take care that it be not too moist.

This snuff, in the course of twelve months, will be of one uniform and agreeable flavour; and will keep good and mending, for many years. When old, this sort will hardly be inferior to any of the plain snuffs made in Spain.

London imitation of Spanish and other foreign snuffs.

The fine powder, which is the best part of the snuff as it comes from abroad is sifted from the bale-snuff; and the coarse and stalky part left, is ground down, previously mixed with strong cheap tobacco powder, or dust, along with savine, brick dust, yellow sand, the sweeping of tobacco, old rotten wood, and with many other filthy vegetable substances, both dry and green, to pass as the real flavour of tobacco. All or most of these ingredients being mixed into one body. This is nothing more than colouring the filthy compound with red ochre, or umbre or other noxious red or brown colour, mixed with water and molasses.

The whole, when properly incorporated, is now passed through a hair sieve, to mix it more intimately; and is then left for some time to sweat, or become equally moist. This moistness is intended to imitate the oiliness which is peculiar to the real genuine rancia from Havannah.

This snuff is packed in barrels, tin canisters, and stone jars, so that it may come out in lumps, like the Spanish snuffs. This is done to deceive the purchaser, on whom this bad compound is imposed for real Spanish snuff. Such is the composition of a very great part of what is made and sold for common Spanish snuff.

To make transparent soap.

Suet is the basis of all the soaps of the toilette, known by the name of Windsor soap, because olive oil forms a paste too difficult to melt again, and contains an odour too strong to be mixed with essences. The suet soap dissolved hot in alcohol retakes its solid state by cooling. To this fact is due the discovery of transparent soap, which, if well prepared, has the appearance of fine white candied sugar; it may also be coloured, and the vegetable hues, for this purpose, are preferable to mineral; any person may make this soap, by putting in a thin glass phial, and half of a cake of Windsor soap-shavings; fill it with one half of alcohol, and put it near the fire till the soap is dissolved; this mixture placed into a mould to cool, produces the transparent soap.

To make Windsor soap.

Melt hard curd soap, and scent it with oil of karni, and essence of bergamot, bought at the druggists'; or the essence of bergamot may be omitted.

To make almond soap.

Upon 1 lb. of quicklime, pour 3 quarts of boiling distilled water; add 1 lb. of salt of tartar, dissolved in 1 quart of water; cover the vessel, and when cold, filter through a cotton cloth: a pint should weigh exactly 16 oz. troy; if more, add distilled water, and if less evaporate. Then add 1-3d of oil of almonds, simmer them together for some hours, or until the oil forms a jelly; when cool, which may be tried on a small quantity, add common salt, and then continue boiling till the soap is solid; when cold, skim off the water and then pour into moulds.

Another method.—Take 2 lbs. of soap ley, made of barilla or kelp so strong that a bottle holding half a pint of water will hold 11 ounces of the ley, and 4 lbs. of oil of almonds; rub them together in a mortar, and put the mixture into tin moulds, where let it be for some weeks, till the combination is perfect.

To make marbled soap balls.

Take 10 lbs. of white oil-soap and 10 lbs. of Joppa soap. Cut them into small square pieces, which set to dry for three days: the oil-soap, particularly, must be thus dried.

Scrape, very finely, five pounds of oil soap, which dry, for one day, in the open air, mix it well in the shaving box, with five pounds of powder, add an ounce and a half of the best vermillion.

In mixing, place pieces of soap, and coloured powder, in layers in the box, making in all, four alternate layers of each. When a layer of each has been placed in the box, sprinkle a pint of rose water over the *cut soap;* for if it be much combined with the powder, it will become lumpy and hard, and consequently spoil the wash-balls. The same quantity of rose water is to be used for moistening each of the other soap layers. Next mix a pint of thin starch, which has been well boiled in half a pint of rain water, with half a pint of rose water, and distribute it equally well mixed among the mass, by turning it over repeatedly, and then press it down close with the hands. If a piece be now cut out from the mass, the operator will perceive whether the marbling is sufficiently good; and if so, he may proceed immediately to form his wash balls.

To imitate Naples soap.

Take of fresh ley, strong enough to bear an egg, eight pounds; and put to it a deer's, goat's, or lamb's suet, (which has previously been well cleansed from all skins, &c. by rose-water) two pounds, and one pound of olive oil, or rather behn-nut oil. Let all these simmer over the fire in a well glazed pot, until it be pretty nearly of the consistence of crown or Naples soap; then turn it out into a large flat pan, which set on the leads or roof of the house, exposed, to the heat of the sun for fifty days. The pan must be covered over with a bell glass, such as the gardeners use, and the mixture must be stirred well once a day, during the whole of this time.

In about six weeks or two months, the operator will have a most excellent gronnd work for Naples soap, which only requires perfuming in the following manner, to render it even preferable to the foreign sorts.

Take of oil of rhodium, one ounce, of spirit of ambergris, two ounces and a half, spirit of musk, half an ounce; mix them well together, and then put the compound into the pan of soap. Stir the whole well, and incorporate the perfumes with the soap, on a marble stone by means of a muller. Put up into small jars, or preserve in a mass in a large jar, according to sale or convenience. If kept for 12 months, this soap will be found by comparison, to be far preferable to the best soap that ever came from Naples.

INKS, &c.

To make common black ink.

Pour a gallon of boiling soft water on a pound of powdered galls, previously put into a proper vessel. Stop the mouth of the vessel, and set it in the sun in summer, or in winter where it may be warmed by any fire, and let it stand two or three days. Then add half a pound of green vitriol powdered, and having stirred the mixture well together with a wooden spatula, let it stand again for two or three days, repeating the stirring, when add further to it 5 ounces of gum arabic dissolved in a quart of boiling water, and lastly, 2 ounces of alum, after which let the ink be strained through a coarse linen cloth for use.

Another.—A good and durable black ink may be made by the following directions: To 2 pints of water add 3 ounces of the dark coloured rough-skinned Aleppo galls in gross powder, and of rasped logwood, green vitriol, and gum arabic, each 1 oz.

This mixture is to be put into a convenient vessel, and well shaken four or five times a day, for ten or twelve days, at the end of which time it will be fit for use; though it will improve by remaining longer on the ingredients. Vinegar instead of water makes a deeper-coloured ink; but its action on pens soon spoils them.

Shining black ink.

Beat up well together in an iron mortar the following ingredients in a dry state; viz. 8 oz. of the best blue gall-nuts, 4 oz. of copperas, or sulphate of iron, 2 oz. of clear gum arabic, and 3 pints of clear rain water.

When properly powdered, put to the above; let the whole be shaken in a stone bottle three or four times a day, for seven days, and at the end of that time, pour the liquor off gently into another stone bottle, which place in an airy situation to prevent it from becoming foul or mothery. When used put the liquor into the ink-stand as required.

Process for making the best ink.

Take 6 quarts (beer measure) of clear water, soft or hard, and boil in it for about an hour, 4 oz. of the best Campeachy logwood, chipped very thin across the grain, adding, from time to time, *boiling* water to supply in part the loss by evaporation; strain the liquor while hot, and suffer it to cool. If the liquor is then short of 5 quarts, make it equal to this quantity, by the addition of cold water. After which, let 1 lb. of bruised blue galls, or 20 oz. of the best common galls, be added. Let a paste be prepared by triturating 4 oz. of sulphate of iron (green vitriol) calcined to whiteness, and let half an ounce of acetite of copper (verdigris) be well incorporated together with the above decoction, into a mass, throwing in also, 3 oz. of coarse brown sugar, and 6 oz. of gum Senegal, or Arabic. Put the materials into a stone bottle of such a size as to half fill it; let the mouth be left open, and shake the bottle well, twice or thrice a day. In about a fortnight it may be filled, and kept in well stopped bottles for use. It requires to be protected from the frost which would considerably injure it.

Indelible black ink without galls or green vitriol.

Infuse a pound of promegranate peels broken to a gross powder, for 24 hours in a gallon and a half of water, and afterwards boil the mixture till 1-3d of the fluid be wasted. Then add to it 1 lb. of Roman vitriol, and 4 oz. of gum arabic powdered, and continue the boiling till the vitriol and gum be dissolved, after which the ink must be strained through a coarse linen cloth, when it will be fit for use.

This ink is somewhat more expensive and yet not so good in hue as that made by the general method; but the colour which it has is not liable to vanish or fade in any length of time.

Indestructible ink for resisting the action of corrosive substances.

On many occasions, it is of importance to employ an ink indestructible by any process, that will not equally destroy the material on which it is applied. For black ink, 25 grains of copal, in powder, are to be dissolved in 200 grains of oil of lavender, by the assistance of a gentle heat; and are then to be mixed with 2 1-2 grains of lamp black, and 1-2 a grain of indigo: for red ink use 120 grains of oil of lavender, 17 grains of copal, and 60 grains of vermilion. A little oil of lavender, or of turpentine, may be added, if the ink be found too thick. A mixture of genuine asphaltum dissolved in oil of turpentine, amber varnish, and lamp black, would be still superior.

This ink is peculiarly useful for labelling phials, &c. containing chemical or corrosive substances.

Best ink powder.

Infuse a pound of galls powdered, and 3 oz. of pomegranate peels, in a gallon of soft water for a week, in a gentle heat, and then strain off the fluid through a coarse linen cloth. Then add to it 8 oz. of vitriol dissolved in a quart of water, and let them remain for a day or two, preparing in the meantime a decoction of logwood, by boiling a pound of the chips in a gallon of water, till 1-3d be wasted, and then straining the remaining fluid while it is hot. Mix the decoction and the solution of galls and vitriol together, and add 5 oz. of gum arabic, and then evaporate the mixture over a common fire to about 2 quarts, when the remainder must be put into a vessel proper for that purpose, and reduced to dryness, by hanging the vessel in boiling water. The mass left, after the fluid has wholly exhaled, must be well powdered; and when wanted for use, may be converted into ink by the addition of water.

Another.—Compositions were also formerly made for portable, or extemporaneous inks, without galls or vitriol, of one of which the following is a recipe:—Take 1-2 a pound of honey, and the yolk of an egg, and mix them well together. Add 2 drachms of gum arabic finely levigated, and thicken the whole with lamp-black to the consistence of a stiff paste, which, being put to a proper quantity of water, may be used as ink.

Ink powder for immediate use.

Reduce into subtle powder 10 oz. of gall-nuts, 3 oz. of Roman vitriol, (green copperas), with 2 oz. each of roche alum and gum arabic. Then put a little of this mixture into a glass of white wine, and it will be fit for instant use.

Another.—Take equal parts of black rosin, burnt peach or apricot stones, vitriol and gall-nuts, and 2 of gum arabic, put the whole in powder or cake as required.

To make exchequer ink.

To 40 pounds of galls, add 10 pounds of gum, 9 pounds of copperas, and 45 gallons of soft water. This ink will endure for centuries.

To make red ink.

Take of the raspings of brazil wood a quarter of a pound, and infuse them two or three days in vinegar, which should be colourless where it can be so procured. Boil the infusion an hour over a gentle fire, and afterwards filter it, while hot, through paper laid in an earthenware cullender. Put it again over the fire, and dissolve in it, first 1-2 an ounce of gum arabic, and afterwards of alum and white sugar, each 1-2 an ounce. Care should be taken that the Brazil wood be not adulterated with the Brasiletto or Campeachy wood.

Other preparations.—Red ink may likewise be prepared, by the above process, of white wine instead of vinegar; but it should be sour, or disposed to be so, otherwise, a third or fourth of vinegar should be added, in order to its taking the stronger tincture from the wood. Small beer has been sometimes used for the same purpose, but the ink will not be so bright, and when it is used, vinegar should be added, the quantity of gum arabic diminished, and the sugar wholly omitted.

Red ink from vermillion.

Take the glair of four eggs, a tea-spoonful of white sugar, or sugar candy, beaten to a powder, and as much spirit of wine; beat them together, till they are of the consistence of oil: then add such a proportion of vermilion as will produce a red colour sufficiently strong; and keep the mixture in a small phial or well-stopped ink-bottle for use. The composition should be well shaken together before it is used.

Instead of the glair of eggs, gum water is frequently used; but thin size, made of isinglass, with a little honey, is much better for the purpose.

Permanent red ink.

Take of oil of lavender, 120 grains, of copal in powder, 17 grains, red sulphuret of mercury, 60 grains. The oil of lavender being dissipated with a gentle heat, a colour will be left on the paper surrounded with the copal; a substance insoluble in water, spirits, acids, or alkaline solutions.

This composition possesses a permanent colour, and a MS. written with it, may be exposed to the process commonly used for restoring the colour of printed books, without injury to the writing. In this manner interpolations with common ink may be removed.

Green writing ink.

Take an ounce of verdigris, and having powdered it, put to it a quart of vinegar, &c. after it has stood two or three days, strain off the liquid: or, instead of this, use the crystals of verdigris dissolved in water; then dissolve, in a pint of either of these solutions, five drachms of gum arabic, and two drachms of white sugar.

Yellow writing ink.

Boil two ounces of the French berries in a quart of water, with half an ounce of alum, till one-third of the fluid be evaporated. Then dissolve in it two drachms of gum arabic, and one drachm of sugar, and afterwards a drachm of alum powdered.

Blue ink.

This may be made by diffusing Prussian blue, or indigo, through strong gum-water. The common water-colour cakes, diffused in water, will make sufficiently good coloured inks for most purposes.

To make copper plate printers' ink.

Ink for the rolling-press is made of linseed oil, burnt in the same manner as that for common printing ink; and is then mixed with Frankfort-black, finely ground. There are no certain proportions which can be determined in this kind of ink; every workman adding oil or black to his ink, as he thinks proper, in order to make it suit his purpose. Some, however, mix a portion of common boiled oil which has never been burnt: but this must necessarily be a bad practice, as such oil is apt to go through the paper; a fault very common in prints, especially if the paper is not very thick. No soap is added; because the ink is not cleared off from the copper-plates, with alkaline-ley, as in common printing, but with a brush dipped in oil.

Another method.—Instead of Frankfort, or other kinds of black commonly used, the following composition may be substituted, and will form a much deeper and more beautiful black, than can be obtained by any other method. Take of the deepest Prussian blue five parts, and of the deepest coloured lake and brown pink, each one part. Grind them well with oil of turpentine, and afterwards with the strong and weak oils in the manner and proportion above directed. The colours need not be bright for this purpose, but they should be the deepest of the kind, and perfectly transparent in oil, as the whole effect depends on that quality.

To make printers' ink.

Ten or twelve gallons of nut-oil are set over the fire, in a large iron pot, and brought to boil. It is then stirred with an iron ladle: and whilst boiling, the inflammable vapour arising from it, either takes fire of itself, or is kindled, and is suffered to burn in this way for about half an hour: the pot being partially covered, so as to regulate the body of the flame, and, consequently, the heat communicated to the oil. It is frequently stirred during this time, that the whole may be heated equally; otherwise, a part would be charred, and the rest left imperfect. The flame is then extinguished by entirely covering the pot. The oil, by this process, has much of its unctuous quality destroyed, and when cold is of the consistence of soft turpentine: it is then called varnish. After this, it is made into ink, by mixture with the requisite quantity of lamp-black; of which, about 2 1-2 oz. are sufficient for 16 oz. of the prepared oil. The oil loses, by the boiling, about an eight of its weight, and emits very offensive fumes. Several other additions are made to the oil during the boiling, such as crusts of bread, onions, and sometimes turpentine. These are kept secret by the preparers. The intention of them is more effectually to destroy part of the unctuous quality of oil; to give it more body, to enable it to adhere better to the wetted paper, and to spread on the types neatly and uniformly.

Besides these additions, others are made by the printers, of which the most important is a little fine indigo in powder, to improve the beauty of the colour.

Another method.—One lb. of lamp-black, ground very fine, or run through a lawn sieve, 2 oz. of Prussian blue, ground very fine, 4 oz. of linseed oil, well boiled and skimmed, 4 oz of spirit of turpentine, very clear, 4 oz. of soft varnish, or neat's foot oil. To be well boiled and skimmed, and while boiling, the top burned off by several times applying lighted paper. Let these be well mixed, then put the whole in a jug, place that in a pan, and boil them very carefully one hour.

A fine black printing ink.

Less turpentine and oil, without Prussian blue, for common ink.

Best printing ink.

In a secured iron pot, (fire outside when possible), boil 12 gallons of nut oil; stir with iron ladle, long handle; while boiling, put an iron cover partly over, set the vapour on fire by lighted paper often applied, keep well stirring, and on the fire, one hour at least, (or till the *oily* particles are burnt), then add 1 lb. of onions cut in pieces, and a few crusts of bread, to get out the residue of oil; also varnish, 16 oz. fine lamp-black, 3 oz. ground indigo, 1-2 oz. Boil well one hour.

Good common printing ink.

Take 16 oz. of varnish, 4 oz. of linseed oil, well boiled, 4 oz. of clear oil of turpentine, 16 oz. of fine lamp black, 2 oz. of Prussian blue, fine, 1 oz. of indigo, fine. Boil one hour.

Printers' red ink.

Soft varnish and vermilion with white of eggs, not very thick. Common varnish red-lead, and orange.

Blue.—Prussian blue, and a little ivory, with varnish and eggs, very thick. Common indigo and varnish; then *wash off* with boiling lees.

Perpetual ink for inscriptions on tomb stones, marbles, &c.

This ink is formed by mixing about three parts of pitch with one part of lamp-black, and making them incorporate by melting the pitch. With this composition, used in a melted state, the letters are filled, and will, without extraordinary violence, endure as long as the stone itself.

To make Indian ink.

Let ivory or lamp-black be mixed with a small portion of Prussian blue or indigo, for a blue black, and let the same blacks be united with raw or burnt umber, bistre, vandyke, or any other brown, instead of the blue, for a brown black. These should be mixed together, in a weak gum-water (perhaps matt-work would answer the purpose better) first levigating them very fine, in common water, on a marble slab. When dried to the consistence of a paste, let the glutinous matter be well mixed with them. That will be found sufficiently strong, which binds the composition, so as to prevent rubbing off by the touch. Indian ink drawing should be handled as slightly as possible. Too much gum in the composition will create an offensive gloss.

Another method.—Take of isinglass, 6 oz., and 12 oz. of soft water; make into size; add 1 oz. of refined liquorice, ground up with 1 oz. of genuine ivory-black, and stir the whole well. Evaporate the water in *balneum mariæ;* and form the sticks or cakes.

A substitute for Indian ink.

Boil parchment slips, or cuttings of glove leather, in water till it forms a size, which, when cool, becomes of the consistence of jelly, then, having blackened an earthen plate, by holding it over the flame of a candle, mix up with a camel hair pencil, the fine lamp-black thus obtained, with some of the above size, while the plate is still warm. This black requires no grinding, and produces an ink of the same colour, which works as freely with the pencil, and is as perfectly transparent as the best Indian ink.

Permanent ink for marking linen.

Take a drachm of nitrate of silver (lunar caustic,) dissolve it in a glass mortar in double its weight of pure water; add to this solution 10 drops of nitric acid: this is the ink. In another glass vessel dissolve a drachm of salt of tartar in 1 1-2 oz. of water; this is usually named the liquid pounce, with which the linen is wet previously to the application of the ink.

Another method.—Take of lunar caustic, 2 drachms, distilled water, 6 ounces. Dissolve, and add, gum water, 2 dr. Dissolve also prepared natron, 1-2 oz. in 4 ounces of water, and add gum water, 1-2 ounce.

Wet the linen where you intend to write with this last solution; dry it, and then write upon it with the first liquor, using a clean pen. If potash is used instead of natron, the ink will spread.

Sympathetic inks.

Sympathetic inks are such as do not appear after they are written with, but which may be made to appear at pleasure, by certain means to be used for that purpose. A variety of substances have been used as sympathetic inks, among which are the following:

Nitro-muriates of gold and tin.

Write with a solution of gold in aqua regia, and let the paper dry gently in the shade. Nothing will appear, but draw a sponge over it, wetted with a solution of tin in aqua regia, and the writing will immediately appear of a purple colour.

Gallate of iron.

Write with an infusion of galls, and when the writing is required to appear, dip it into a solution of sulphate of iron: the letters will appear black.

Nitro-muriate of cobalt.

Pulverize 1 ounce of cobalt, and pour over it 4 ounces of nitric acid in a retort. Digest in a sand bath for 6 hours. An ounce of muriate of soda diluted in 4 ounces of water must now be added; filter and preserve the compound. When to be used, it must be diluted with three times its bulk of distilled water, to prevent corrosion of the paper.

The nitric acid, alone, will answer the purpose without the muriate of soda. The salt here obtained is seldom a pure salt of cobalt, as iron is so often combined with it; the solution of cobalt and iron is *green* when exposed to heat: but when a pure blue is wished for, the oxide of cobalt must be precipitated by pure potass, which re-dissolves the oxide of cobalt, and answers as a sympathetic ink. This is of a red colour before it is written with, and blue after.

Sympathetic ink of cobalt.

Digest zaffre in aqua-regia, and dilute the solution with four times its weight of pure water. Characters written with it, do not appear till the paper is warmed, when traces of the pen are visible, under a fine sea-green colour. This colour disappears as the paper cools, and is renewed on warming again: and thus alternately vanishes and re-appears, for an interminable number of times. As the solution of regulus of cobalt, or zaffre in spirit of nitre, acquires a reddish colour, by the amplification of heat, so a variety of colours may be given. Thus landscapes may be sketched with common ink, to give a prospect of winter; while the solution of cobalt in aqua-regia, on the application of heat, gives the verdure of spring; and the nitrous solution may represent fruit, flowers, &c.

Another sympathetic ink.—Write on paper with a solution of nitrate of bismuth, and smear the writing over, by means of a feather with some infusion of galls. The letters which were before invisible, will now appear of a brown colour. If the previous use of nitrate of bismuth be concealed from the spectators, great surprise will be excited by the appearance of writing, merely by the dash of a feather. The same phenomenon will take place, when infusion of galls is written with, and the salt of bismuth applied afterwards.

Another.—Write on a sheet of paper, any sentence with a transparent infusion of gall-nuts, and dip the paper in a transparent solution of the sulphate of iron. The writing, which was before invisible, will now, on a slight exposure to the air, turn quite *black.* A neater way of performing this experiment will be by smearing the written parts over with a feather dipped in the solution of the metallic salt; it may also be reversed, by writing with the salt, and smearing with the infusion.

Another.—If a letter be written with a solution of sulphate of iron, the inscription will be invisible; but if it afterwards be rubbed over by a feather, dipped in a solution of prussiate of potass, it will appear of a beautiful blue colour.

Another.—Write a letter with a solution of nitrate of bismuth.—The letters will be invisible. If a feather be now dipped in a solution of prussiate of potass, and rubbed over the paper, the writing will appear of a beautiful yellow colour, occasioned by a formation of prussiate of bismuth.

To prevent ink from freezing in winter.

Instead of water use brandy, with the same ingredients which enter into the composition of any ink, and it will never freeze.

To prevent mould in inks.

In order to secure the above and other inks from growing mouldy, a quarter of a pint or more of spirit of wine, may be added; but to prevent its containing any acid, which may injure the ink, a little tartar or pearl-ashes should be added, previously, and the spirit poured off from it, which will render it innocent with regard to the colour of the ink.

Another method.—The most simple, yet effectual method, is to infuse a small piece of salt about the size of a hazel nut to each quart.

To take out spots of ink.

As soon as the accident happens, wet the place with juice of sorrel or lemon, or with vinegar, and the best hard white soap.

To make new writing look old.

Take a drachm of saffron, and infuse it into half a pint of ink, and warm it over a gentle fire, and it will cause whatever is written with it to turn yellow, and appear as if of many years standing.

To write on greasy paper or parchment.

Put to a bullock's gall a handful of salt, and a quarter of a pint of vinegar, stir it until it is mixed well; when the paper or parchment is greasy, put a drop of the gall into the ink, and the difficulty will be instantly obviated.

To restore decayed writings.

Cover the letters with phlogisticated or prussic alkali, with the addition of a diluted mineral acid; upon the application of which, the letters change very speedily to a deep blue colour, of great beauty and intensity. To prevent the spreading of the colour, which, by blotting the parchment, detracts greatly from the legibility, the alkali should be put on first, and the diluted acid added upon it. The method found to answer best has been, to spread the alkali thin with a feather or a bit of stick cut to a blunt point. Though the alkali should occasion no sensible change of colour, yet the moment the acid comes upon it, every trace of a letter turns at once to a fine blue, which soon acquires its full intensity, and is beyond comparison stronger than the colour of the original trace. If, then, the corner of a bit of blotting paper be carefully and dexterously applied near the letters, so as to imbibe the superfluous liquor, the staining of the parchment may be in a great measure avoided; for it is this superfluous liquor which, absorbing part of the colouring matter from the letters, becomes a dye to whatever it touches. Care must be taken not to bring the blotting paper in contact with the letters, because the colouring matter is soft whilst wet, and may be easily rubbed off. The acid chiefly employed is the marine; but both the vitriolic and nitrous succeed very well. They should be so far diluted as not to be in danger of corroding the parchment, after which the degree of strength does not seem to be a matter of much nicety.

To take impressions from recent manuscripts.

This is done by means of fusible metals. In order to show the application of it, paste a piece of paper on the bottom of a china saucer, and allow it to dry; then write upon it with common writing ink, and sprinkle some finely powdered gum arabic over the writing which produces a slight relief. When it is well dried, and the adhering powder brushed off, the fusible metal is poured into the saucer, and is cooled rapidly, to prevent crystallization. The metal then takes a cast of the writing, and when it is immersed in slightly warm water, to remove adhering gum impressions may be taken from it as from a copper plate.

Another method.—Put a little sugar into a common writing ink, and let the writing be executed with this upon common paper, sized as usual. When a copy is required, let unsized paper be taken, and lightly moistened with a sponge. Then apply the wet paper to the writing, and passing lightly a flat iron, of a moderate heat, such as is used by laundresses, over the unsized paper, the copy will be immediately produced. This method requires no machine or preparation, and may be employed in any situation.

To produce a fac-simile of any writing.

The pen should be made of glass enamel; the point being small and finely polished; so that the part above the point may be large enough to hold as much, or more ink, than a common writing pen.

A mixture of equal parts of Frankfort black, and fresh butter, is now to be smeared over sheets of paper, and rubbed off after a certain time. The paper, thus smeared, is to be pressed for some hours; taking care to have sheets of blotting-paper between each of the sheets of black paper. When fit for use, writing paper is put between sheets of blackened paper, and the upper sheet is to be written on, with common writing ink, by the glass or enamel pen. By this method, not only the copy is obtained on which the pen writes, but also, two, or more, made by means of the blackened paper.

Substitute for copying machines.

In the common ink used, dissolve lump sugar (1 drachm to 1 ounce of ink.) Moisten the copying paper, and then put it in soft cap paper to absorb the superfluous moisture.—Put the moistened paper on the writing, place both between some soft paper, and either put the whole in the folds of a carpet, or roll upon a ruler three or four times.

To copy writings.

Take a piece of unsized paper exactly of the size of the paper to be copied; moisten it with water, or with the following liquid; Take of distilled vinegar, two pounds weight, dissolve it in one ounce of boracic acid; then take four ounces of oyster shells calcined to whiteness, and carefully freed from their brown crust; put them into the vinegar, shake the mixture frequently for twenty-four hours, then let it stand till it deposits its sediment; filter the clear part through unsized paper into a glass vessel; then add two ounces of the best Aleppo galls bruised, and place the liquor in a warm place; shake it frequently for 24 hours, then filter the liquor again through unsized paper, and add to it after filtration, one quart, ale measure, of pure water. It must then stand 24 hours, and be filtered again; if it shows a disposition to deposit any sediment, which it generally does. When paper has been wet with this liquid, put it between two thick unsized papers to absorb the superfluous moisture; then lay it over the writing to be copied, and put a piece of clean writing paper above it. Put the whole on the board of a rolling press, and press them through the rolls, as is done in printing copper plates, and a copy of the writing will appear on both sides of the thin moistened paper; on one side in a reversed order and direction, but on the other side in the natural order and direction of the lines.

MEDICINE.

TREATMENT OF EXTERNAL INJURIES.

To diminish inordinate inflammation.

Mix 1 drachm of Goulard's extract of lead, or solution of sugar of lead in water, with 4 ounces of rectified spirit, and 6 ounces of distilled water. Make a lotion which is to be applied to those surfaces where inflammation is very rapid.

Another method.—Dissolve 2 drachms of sulphate of zinc (white vitriol) in a pint of distilled water. To be applied as above.

Marsh-mallow fomentation.

Boil together for a quarter of an hour, an ounce of dried marsh-mallow root with 1-2 an ounce of chamomile flowers in a pint of water; strain through a cloth. The fomenting flannels should be sprinkled with spirits, just before they are applied to the inflamed part.

Fomentation of poppies.

Bruise 4 ounces of dried poppy heads, and then boil them in 6 pints of water, until a quart only remains after straining. This fomentation is to be applied to inflamed parts, where is much pain, but which are required to suppurate.

Refrigerant lotion.

Mix together equal parts of acetated water of ammonia and tincture of camphor; which apply to the inflamed joint or other part.

Another.—Dissolve an ounce of muriate of ammonia in 4 ounces of common vinegar, and add 10 ounces of water, to be applied with or without a cloth to inflamed surfaces.

Another.—Mix together 2 ounces of rectified spirit, and 5 ounces of acetated water of ammonia.

Sedative lotion.

Dissolve half a drachm of sugar of lead in 4 ounces of distilled vinegar, and then add an ounce of common spirits with a pint of water. Linen cloths dipped in this lotion are to be applied to inflamed joints, &c.

Cold and sedative cataplasm.

Take of goulard water a drachm and a half, rectified spirit 2 ounces, water a pint: These are to be mixed with a sufficient quantity of the crumb of a new loaf, so as to form a cataplasm to be applied at night to inflamed parts.

Another.—Mix with crumb of bread as above, 1 drachm of goulard water (or solution of sugar of lead) and a pint of common water that has been boiled.

Cataplasm to hasten suppuration.

Make 2 parts of finely-powdered bran, and 1 part of linseed meal, into a poultice, with boiling water. A little oil should be spread over the surface, just before it is applied.

Another.—Take of crumb of bread and linseed meal, equal parts. Make them into a poultice with boiling milk.

Linseed cataplasm.

Stir linseed flour into boiling water, in sufficient quantity to form a cataplasm of proper consistency, and before application, smear the surface with a little olive, or linseed oil. If irritation, with great pain and tension, or hardness, should prevail, it will be necessary to substitute a decoction of poppy heads for the common water. This poultice is in general use in all the hospitals.

For contusions and sprains.

Immediately after the accident, if no other remedy be at hand, the part may be immersed for a considerable time in water heated to about 112 deg. The application of leeches will be useful, if there is much inflammation, and if there is danger of its spreading.

Cataplasm for the same.

Form a cataplasm or poultice, by mixing vinegar in a sufficient quantity of either oatmeal, linseed meal, or crumb of bread. If linseed meal be used alone, it is apt, from its tenacity, to become hard and dry, thus occasioning inconvenience to the part upon which it is applied; but combined with the other articles, it is very useful for giving the poultice a necessary degree of consistence.

Embrocation for the same.

Shake in a phial, until they become white like milk, 10 drachms of olive oil, with 2 drachms of spirit of hartshorn (water of ammonia); then add 4 drachms of oil of turpentine. When properly mixed, they may be directly used as an embrocation for sprains and bruises.

Where weakness remains in consequence of a sprain, cold water ought to be pumped on it every morning; and a long calico roller should be bound firmly (but not too tight) round it immediately after. By these means, strength will soon be restored.

Another.—Digest 15 ounces of white hard soap, scraped with a knife, in 4 pints of spirit of wine, and 1 pint of water of ammonia, or hartshorn (liquor ammoniæ), previously mixed in a large bottle. When dissolved, add 5 oz. of camphor. When this last is entirely dissolved, the embrocation is fit for use.

This elegant and powerful stimulant was selected from the Pharmacopœia of the Middlesex Hospital:—for private use, the above quantities of the ingredients are to be reduced in proportion to each other, according to the quantity likely to be used in a family. If 1-3d only is required, use 5 oz. of soap, 1 of camphor, 16 oz. of spirit of wine, and 4 oz. of water of ammonia.

Common embrocation.

Pour upon 2 ounces of carbonate of ammonia (smelling salts,) as much distilled vinegar as will dissolve it; then add a pint and a half of common rectified spirit, and shake the whole together in a bottle. It is immediately fit for use, and is an excellent application for sprains and bruises.

Compound camphor embrocation.

Dissolve 3 oz. of camphor in 3 pints of spirit of wine. Then mix 2 pints of distilled vinegar with 1 pint of water, and pour them into the bottle containing the tincture of camphor. This is a most excellent embrocation, necessary to be kept ready made in all families. It and the following were selected, by permission of Mr. Stocker, from among the formulæ of Guy's Hospital.

Application of leeches.

In applying of leeches to the human body, success is rendered more certain by previously drying them, or allowing them to creep over a dry cloth. To attract them, the part should be moistened with cream, sugar, or blood, and if this should be insufficient, the leech may be cooled by touching it with a cloth dipped in cold water. The escape of leeches from the part is to be prevented by covering them with a wine glass or tumbler.

Dislocations.

In almost all cases of dislocation of joints, it will be better, if possible, to await the arrival of a surgeon: but there is one species of luxation, very alarming to the by-standers, and particularly painful and inconvenient to the sufferer, which will admit of immediate relief, if any person, gifted with presence of mind and resolution, will attempt its reduction: this is *dislocation of the lower jaw.* Without attempting to describe the anatomy of the parts concerned, further than to state that either one or both of the balls, or condyles, at the extremity of the lower jaw, have slipped out of their sockets in the upper one, and consequently cause the mouth to be opened to its utmost extent, we lay down the following simple plan to restore them to their proper situation.

Let the two thumbs of the operator be wrapped round by a pocket-handkerchief, and then introduced into the mouth of the patient, and pushed as far as possible between the jaws: while the fingers are, at the same time, applied to each angle of the outsides. Now, attempt to move the bone from its situation, by bringing it, first, a little forwards, and then pressing it forcibly downwards: when it will slip into its place without further trouble.—The patient should, for a time, avoid much speaking, or the chewing of hard substances, in case of a recurrence of the accident.

The handkerchief is used to prevent injury to the operator's hands, which, otherwise, might be considerably hurt by the force with which the condyles return to their sockets.

Fractures.

It is premised, that where a surgeon is at hand, nothing further is to be done by the bystanders, than merely laying the body and the injured limb of the patient, entirely at rest; if the fracture is a *compound one*, that is, if there is a wound, the blood is to be staunched by the pressure of a linen or other handkerchief.

Where medical assistance cannot soon, or at all, be obtained, let the bone be reduced to its usual position, by extension of the limb, feeling at the same time, by pressing with the fingers, that the two broken ends have come into exact contact, and seeing that the position of the rest of the limb is in entire accordance with what it would be, if no fracture had taken place, and the patient were merely in a recumbent posture.

Now apply a plaister of soap cerate, or rags wetted by opodeldoc, or solution of sugar of lead, over the part, and over this a long roller of calico, which must encircle a considerable portion above and below the fracture. Two, three, or four *splints*, or thin lathes of wood, rounded like the bones of stays, are now to be applied under, over, and on each side of the limb, and fastened in their places, by broad tapes or ribbons, or by another roller, not so wide as the former, but extending from end to end of the splints. The limb is now to be placed as follows: if the arm has been broken, the fore-arm is to be placed in a sling, formed by a handkerchief;—if the fore-arm, it is to be laid in a piece of pasteboard, as long as the arm, from the elbow to the wrist, and placed concavely in a sling; if the thigh bone, it is to be laid on its outside, on a pillow; and if the leg, it is to be laid on soft pillows, in the same manner, with the knee a little bent.

On no account is the limb to be moved from these positions for 2 or 3 days, when union will slightly take place; and, even then, the motion of the limb must be very gentle; otherwise, distortion, or shortening of the limb for life, and perhaps, dangerous inflammatory symptoms, may take place.

Compound fractures.

It has been before observed, that a compound fracture is not only the breaking of the bone, but also its protrusion through the integuments, or fleshy part of the limb, so as to cause a more or less extensive wound. In such a case, extraneous bodies, such as dirt, gravel, &c. which may have got into the wound; or small detached portions, or splinters of the bone itself, are to be cautiously removed by means of a sponge, moistened with warm water, or by means of a forceps or small pincers. Should there be any bleeding, it is to be stopped by pressure on the part, or by the application of small pieces of surgeon's lint, or soft old linen or diaper.

If the fractured extremity of the bone protrude through the wound in the integuments, it ought, if possible, to be reduced to its proper situation by manual exertion; but, when this is impracticable, on account of the length of the bone, and the contraction of the muscles, it will be necessary, either to dilate the wound with a knife, or, which is much better, to remove the protruding portion with a very fine saw. If the saw is used the operator ought to have a firm but gentle command over his hand; so as not to work too fast, in case of the saw slipping and causing unnecessary laceration of the surrounding parts; also to move the saw very gently as he approaches the end, so as to avoid breaking the bone and causing additional splinters.

If the fracture be transverse, and the injury to the soft parts of no great extent, dilatation of the wound is to be preferred; but if the bone be broken obliquely, and the protruded portion be so sharp pointed as to endanger great irritation, were it reduced in that state, it will be advisable, either entirely to remove it, or having cut off its pointed end, only to reduce the remainder, by dilating the wound.

The fractured portions of bone being brought into contact, and into their proper places, union of the external wound is to be effected, if no great laceration has taken place, by bringing the parts together, and applying warm strips of adhesive plaister, so as to preserve them in that situation; but if the injury to the soft parts has been so extensive as to render the attempt useless, a pledget of lint is to be applied to the wound, the limb is to be encircled with cloths wetted with some refrigerant lotion, (such as spirits and water, or vinegar and water,) and afterwards a broad bandage or roller is to be lightly applied; all pressure being avoided, as likely to increase the inflammation.

The limb is now to be supported on pillows, and so placed that the wound may be got at with the greatest facility, either to be dressed or inspected. If the inflammation should run high, recourse must be had to bleeding, cooling medicines, and repeated doses of opium: also to refrigerant applications to the part.

Recent cuts and flesh wounds.

Draw the divided parts closely into contact, and retain them in that situation by *adhesive straps* of larger or smaller size, or of a less or greater number, according to the situation of the wound. The breadth of these straps, or ribbons of adhesive plaister, should be from an inch to an inch and a half, and the length from 4 to 12 inches, according to the extent of the incised parts. In applying them, they are first to be slightly warmed, especially in cold weather, and then one end is to be fastened at a moderate distance from the edge on one side. Now, while the union of the parts is preserved by an assistant, the other is to be conducted over to the opposite side, and being drawn tight, is to be affixed to the skin by pressure with the warm hand. A small aperture should be left between the straps, in the most depending part of the wound, for the evacuation of any matter which may afterwards happen to form during the process of adhesion. Over the straps is to be applied a roller or bandage, which may be removed once a day, to inspect the progress of cure; but the straps are by no means to be removed, until the adhesion is complete.

Small cuts and wounds.

Moisten a piece of lint with a saturated solution of copal gum in ether, and apply over the injured part. Moisten it once or twice a day, by pouring a sufficient quantity over it without removing the lint. If it be a cut, care should be taken to bring the edges together, when the application, from its sticking quality, will keep them in that state. A bandage may also be applied; but when the mischief is not extensive, it is unnecessary.

The above will be found the most efficacious application that can be employed in such cases. It should be prepared in every family, instead of the irritating articles generally used for those purposes, which, for the most part, are only productive of injury.

Burns and scalds.

Mr. Cleghorn, a brewer in Edinburgh, has treated burns and scalds with success, by applying, in the first place, vinegar, until the pain abates; secondly, an emollient poultice; and thirdly, as soon as any secretion of matter or watery fluid appears, by covering the sore with powdered chalk.

Liniment for the same.

Take of linseed or olive oil, lime water, each equal parts, or 3 ounces, by measure; Mix, by shaking them together. This liniment is extremely useful in cases of scalds or burns, being singularly efficacious in preventing, if applied in time, the inflammation subsequent to these; or even in removing it after it has come on.

Another.—Lime water with linseed oil has often been used, as a liniment, in the proportion of an ounce and a half of the latter, to 3 ounces of the former. This is a very excellent application.

Another.—Many medical men are partial to the use of lime water and common spirits, immediately after the accident, in proportion of 3 ounces of the latter to 6 ounces of the former. This mixture should be applied cold, and the parts kept constantly covered with fine linen cloth dipped in it.

Another.—Raw potatoes, scraped or grated, may be advantageously applied to recent burns and scalds, if nothing better can conveniently be had. But, perhaps, the best application, immediately after the accident, is common spirits united with a solution of sugar of lead, (liquor acetates plumbi,) in the proportion of 12 ounces of the latter, to four ounces of the former.

Another.—Apply *oatmeal and cold water* to the part affected immediately after the accident; keep it on as a poultice all night; next morning, if not serious, it will be quite well, neither blister nor wound appearing.

In all cases of burns and scalds, it is necessary to observe, that if fever should ensue, gently laxative medicines ought to be administered. The best are castor oil and Epsom salts.

If the injury arising from the scald or burn be very severe, suppuration should be promoted by fomentations and emollient cataplasms. The deformity or constriction of muscles and tendons, which arises from burns and scalds, is to be obviated as much as possible, by bandage and position. Particular attention must be paid to position where joints are concerned, and in burns in the neck. In all, the limbs should be as much as possible in their natural situation of rest; but the head, in particular, should be kept in a proper position.

Extensive burns and scalds.

In several bad cases of burns and scalds, the topical application of well-carded cotton wool has succeeded in effecting a cure in a few days. For this discovery we are indebted to chance: —The child of a negro in the West Indies, in consequence of falling into boiling water, was most dreadfully scalded; the mother, being ignorant of any mode of treatment, immediately laid the child on the cotton wool she had been carding, and covered it over with it. The cotton wool adhered closely to the injured parts, and being caked by the discharge, completely defended the surface from the action of the atmosphere. In the course of a few days the whole peeled off with the injured skin, leaving a healthy surface covered with a new cuticle. The same treatment has been adopted in Scotland, and elsewhere, in several bad cases of burns and scalds, with similar happy results. When the discharge exudes through the first layer, more cotton must be added to absorb it. In order that it may adhere to the injured part, the surface should be moistened with oil.—*Gazette of Health.*

Cataplasm for ulcers.

Boil any quantity of fresh carrots until they are sufficiently soft to be beaten up into a smooth pulp. This cataplasm is equally beneficial in the cure of *cancerous*, as well as *scorbutic ulcers*. The latter are known by a brown colour, the discharge being thin and corroding, whilst the fungous excrescences which shoot out, bleed on the slightest touch. The ulcer is surrounded by a livid ring, or areola, in which small spots are frequently observed. The former are known by their very irregular surface, from several parts of which blood exudes. They are attended by shooting pains, and have a fetid discharge.

Another.—Boil any quantity of the bottom leaves of the common meadow sorrel, until they are sufficiently soft, then beat them into a smooth pulp, which is to be applied as a cataplasm to ulcers of the above-mentioned nature.

Another.—Poultices of the pulp of apples have been successfully employed on the continent for these ulcers. They are made by mixing 2 ounces of the pulp of boiled apples with the same weight of the crumb of bread.

Lotion for scorbutic ulcers.

Mix from 1 to 2 drachms of muriatic acid (spirit of salt) with a pint of water. This lotion is very useful in cleansing and stimulating the above-mentioned ulcers.

Another.—Make a lotion by dissolving half an ounce of nitrate of potass (salt-petre) in half a pint of common vinegar; with which cleanse the ulcers in question.

Lotion for scrofulous ulcers.

Dissolve an ounce of common salt in a pint of pure or distilled water. Wash the ulcer with this. Sea water is likewise an excellent lotion for this purpose. Sometimes it will be proper to keep the parts immersed in tepid sea-water for about 10 or 15 minutes.

Another.—Mix together 2 ounces of tincture of myrrh, and 2 ounces of lime water. Use as above.

Lotion for cancerous ulcers.

Mix together an ounce and a half of the tincture of muriate of iron, with 7 ounces of distilled water. Apply as a lotion.

Contagious ulcers, peculiar to soldiers and seamen.

This ulcer generates a poison capable of converting other healthy ulcers into its own nature. It generally appears on the inner side of the leg, near the ankle. It exhales a putrid smell, whilst a thin acrimonious humour is discharged which excoriates the neighbouring parts; and fungous excrescences frequently shoot out. The limb becomes much swelled and very painful, whilst the sore bleeds on the slightest touch. If not checked, the most fatal consequences are to be apprehended.

Treatment.

The following remedies have been found most efficacious; viz. the carrot and yeast poultice as mentioned before; a lotion of tincture of myrrh, 1 ounce; with 7 ounces of decoction of bark, in equal parts; 1 scruple of sulphate of copper, or blue vitriol, in solution with distilled water, or with 8 ounces of lime water; camphorated spirit of wine; camphorated vinegar; the cold salt water bath; and the application of the juice of limes. If the sores remain irritable and painful, the hemlock and poppy fomentations are to be used; accompanied with the internal administration of peruvian bark, and other tonic remedies.

Ulcers and sore legs of poor people.

The lotion made according to the following recipe, has been found very beneficial in cases of foul ulcers and sore legs of poor people. It has also succeeded (applied warm) in curing a fistulous ulcer: Take of green vitriol, 3-4 oz. alum 1-2 oz. verdigris, 1-2 a drachm, crude sal ammoniac, 2 scruples.

After reducing them to powder, put them into a new glazed pipkin, holding about a quart. Set it upon a slow fire, and increase by degrees till the ingredients boil up nearly to the top two or three times. Then take it from the fire and set it to cool. Break the pipkin to get the stone out. Stir them round all the time they are on the fire with a lath. The dust and the smoke should not come near the eyes, nose, or mouth. Put a piece of the stone, the size of a walnut, to a quart bottle of soft water. To use, shake the bottle and wet a piece of fine linen four times doubled. Lay it upon a new burn, or old ulcer, The linen should always be kept wet with it. [For this receipt the late Emperor of France gave 10,000 louis-d'ors, after it had been approved of in his hospitals.]

Malt poultice.

Mix as much ground malt with half a pint of yeast as will make a cataplasm of moderate consistence. This poultice is gently stimulating, and very serviceable in destroying the fetid and disagreeable smell which arises from foul ulcers and gangrenous wounds.

Another.—A similar poultice, and for the same purpose, is prepared by stirring into an infusion of malt, as much oat-meal as may be required to make it of a proper thickness, and afterwards adding about a spoonful of yeast.

Strong beer poultice.

Stir into half a pint of ale, or strong beer-grounds, as much oat-meal or linseed-meal, as will make a cataplasm of proper thickness. This will prove an excellent stimulant and antiseptic for foul ulcers. It should be applied as warm as the parts will bear, and should be renewed every six hours.

Yeast poultice.

Mix well together 1 pound of linseed-meal, and a pint of ale yeast. Expose this cataplasm to a gentle heat, until a certain degree of fermentation takes place. This poultice is excellent for stimulating and cleansing foul ulcers.

Charcoal poultice.

To half a pound of the common oatmeal cataplasm, add 2 ounces of fresh burnt charcoal finely pounded and sifted. Mix the whole well together, and apply it to foul ulcers and venereal sores: the fetid smell and unhealthy appearance of which it speedily destroys.

Treatment of whitlow.

This is a small tumour which appears under, or around the finger nail; it is attended with redness and pain, and very quickly advances to suppuration. After the abscess is evacuated of the white matter contained in it, it very soon heals of itself. The loss of the nail, however, is sometimes, through improper management, the consequence of the disease.

In order to check the inflammation in the first instance, and thereby, at once stop the disease, it will be proper frequently to apply the following lotion, that is, until the pain and heat are abated: Dissolve 1 oz. of sal ammoniac, in 2 oz. of common vinegar; adding 1 oz. of rectified spirit, and 12 oz. of distilled water.

Another application.—It sometimes happens that the ulcer, which remains after the discharge of the matter, is very indolent and difficult to heal. In such a case the following application will be of great service.—Rub half an ounce of camphor, in a mortar, with an ounce of olive oil. Now melt over a gentle fire, 8 oz. of olive oil, with 4 oz. of yellow wax, and stir in it half an ounce of a solution of sugar of lead (liquor plumbi acetatis,) when this mixture is cold, pour the camphor and oil, in the mortar, into it; taking care to stir the whole well until quite cold. If suppuration should ensue, marked by a white prominent spot, an opening should immediately be made, that the matter may escape.

Whitlow at the extremity of the finger.

This kind of whitlow being more deeply seated than that of the nail, is more severe, and is attended by throbbing and acute pain. The matter, likewise, often insinuates itself beneath the nail. To prevent suppuration it will be proper to keep the finger immersed for a long time in warm water; and to apply the lotion, recommended for the same purpose, in common whitlow. If these fail in effecting a resolution of the tumour, an early and free incision should be made through the integuments, and carried to the bottom of the diseased part; after which the blood may be allowed to flow for some time: the opening is to be treated afterwards as a common wound, viz. by the application of adhesive plaster.

Another remedy.—Dr. Balfour, of Edinburgh, has found the application of pressure in incipient cases of whitlow to succeed in preventing the formation of matter, and speedily to cure the disease. He applies compression with the hand in a degree which the patient can easily bear, with the view of preventing extensive suppuration, and then a narrow fillet. This operation, in severe cases, is repeated three or four times in the course of two days, when the pain and swelling disappear, leaving a single spec of pus at the point of the thumb, immediately under the skin. If vent be given to this by the slightest touch of the lancet, the wound will heal up immediately.

Boils.

Suppuration should be promoted by poultices, fomentations, &c. long exposure of the part affected to the vapour of hot water, and by stimulant plaisters. When sufficiently ripe, the matter ought to be evacuated.

When there is a disposition in the body to the formation of boils, Peruvian bark, and Port wine, preparations of iron and acids, and sea-bathing, have been found serviceable: also the use of diuretics, as, cream of tartar, and nitre in small quantity.

White swelling.

This is known by gradual or sudden pain in the knee joint. In the early stage leeches, fomentations, and refrigerant lotions should be applied. If not reduced, the repeated application of blisters will be proper. Mr. Russel, an eminent medical practitioner, recommends the following stimulating plaister to be applied to the joint. Reduce to a fine powder, 2 oz. of gum ammoniac, and then add as much vinegar of squills to it, as will form it into a paste or plaister, by beating, fit to be spread on a piece of leather.

Another plaister.—Dissolve 3 oz. of gum ammoniac in vinegar of squills as above, after which add 2 drachms of extract of hemlock, and 1 drachm of Goulard's extract of lead, or solution of sugar of lead, boil the whole to the consistence of a plaister, and spread upon leather.

Another.—Dr. Kirkland recommends a volatile plaister for this disease, made after the following manner: Melt together in an iron ladle, or earthen pipkin, 2 oz. of soap and 1-2 an oz. of litharge plaister. When nearly cold, stir in 1 drachm of sal ammoniac, in fine powder: spread upon leather and apply to the joint as above.

If the above methods fail, and ulceration takes place, a surgeon should be applied to without delay.

Ointment for chaps and eruptions of the skin.

Simmer ox-marrow over the fire, and afterwards strain it through a piece of muslin into gallipots. When cold, rub the part affected.

Ring worm.

Mr. T. J. Graham, of Cheltenham, recommends the lime-water which has been used for purifying gas, as a very efficacious remedy in the above troublesome disease. The head is to be well cleansed morning and evening with soap and water, and afterwards washed with the lime-water from the gas-works. The above *lime-water* is a very heterogeneous compound, so that it is impossible to say which of its ingredients is effectual. It contains lime, ammonia, sulphuretted hydrogen, volatile oil, and, probably, several other compounds of a more complex nature.—*Monthly Magazine,* 1822.

Scald head.

Take of sulphur, 1 oz. lard, 1 do. sal ammoniac, 2 drachms: Mix for an ointment, to be rubbed upon the part affected two or three times a day.

Ointment for scald-head, ring worm, &c.

The following ointment for scald head, ringworm, and tetters, has uniformly succeeded in speedily effecting a cure:

Take of sub-acetate of copper (in very fine powder), half a drachm, prepared calomel, 1 dr. fresh spermaceti ointment, 1 oz. Mix well together. To be rubbed over the parts affected every night and morning. This ointment is also very efficacious in cases of foul and languid ulcers.

Useful properties of stavesacre.

Stavesacre is chiefly employed, in external applications, for some kinds of cutaneous eruptions, and for destroying lice and other insects; inasmuch that from this virtue it has received its name in different languages. The fine powder is put into the hair each night, and combed out the following morning. It is safe, and much used after a long sickness.

Lotion for leprosy.

Wash the parts affected every morning and evening with the following composition; Take of oxymuriate of mercury, 4 grains, pure pyroligneous acid, 1 oz. distilled water, 7 do. Mix.

Leprous affections of the skin.

Dr. Hufeland praises the excellent effects of the oil of the walnut kernel in leprous and other cutaneous complaints. It is one of the safest, simplest, and most efficacious external remedies that can be employed, as it mitigates the pains, and that burning sensation, sometimes almost insupportable, which accompany these obstinate diseases; it never seems to have any ill effect, if attention be given to the eruption suddenly disappearing, or diving, as it is said, by repulsion—a circumstance which frequently happens by the application of *metallic* ointments, and which is often attended with much danger to the constitution; although it cures the cutaneous affection in a short time, it is not followed by any bad consequences, provided the eruption does not originate in any obstinate internal or general disease. In a child, which was almost covered with chronic and suppurating pimples, against which internal remedies, baths, and mercurial ointments, had been employed, without producing a perfect cure, the oil of walnut kernel was used with complete success. It is, likewise, an excellent remedy in small cutaneous eruptions that are now and then observed in children. The oil ought to be fresh, expressed without heat, and applied to the affected places twice or thrice a day.

Itch ointment.

Take of powdered white hellebore, 2 drachms, flowers of sulphur, 1 oz. essence of lemon, 1 oz. hogs' lard, 2 oz. Make it into an ointment. Smear all the joints for three nights with this, wash it off in the morning with soap and water. Repeat the smearing three times at the interval of two days, and the most inveterate itch is certain to disappear. It will be well, at the same time, to take, night and morning, a tea spoonful of an electuary of flowers of sulphur mixed with honey or treacle.

To remove chilblains.

Take an ounce of white copperas, dissolved in a quart of water, and occasionally apply it to the affected parts. This will ultimately remove the most obstinate blains.—N. B. This application must be used before they break, otherwise it will do injury.

Another method.—Take a piece of fresh wood of the fir, made flat and smooth, and hold it to the fire, till it becomes moderately warm, and all the turpentine begins to exude; then place the part affected upon this board, and keep it there as long as can be well borne; after which, let the part be washed with warm water, wrapped up in flannel, and kept free from cold. This application is improper if the chilblain be broken, but if applied before it has arrived at that stage, it has never failed in removing the complaint after two or three applications.

Another.—Crude sal ammoniac one ounce, vinegar half a pint; dissolve, and bathe the part, if not yet broken, two or three times a day. If sal ammoniac is not at hand, alum or common salt will do, but not so effectually. If the chilblains are of very long continuance, and obstinate, touch them with equal parts of liquid opodeldoc (*linimentum saponis,*) and tincture of Spanish flies, or rather less of the latter. If the chilblains break, poultice or dress them with basilicon, and add turpentine if necessary.

Another.—Take of alum, 2 drachms, white vitriol, 2 do. vinegar, 4 oz. spirit of wine, 2 oz. water, half a pint. Mix. To be applied to the chilblains every night.

Another.—Take of vinegar, proof spirit, each half a pint, alum, 2 dr. Mix. To be applied every night and morning.

Another.—The following ointment for this annoying disease, has been attended with the most beneficial effect: Take of citrine ointment, 1 oz, oil of turpentine, 2 drachms, olive oil, 4 do. Mix. To be well rubbed over the parts affected every night and morning.

Another.—The following has also been found very beneficial in the cure of chilblains, both in the incipient or inflammatory stage, or when advanced to ulceration. When in the former state, the part should be well rubbed over with it by means of a warm hand, and afterwards kept covered with *soft* thin leather. When ulcerated, it should be applied on lint, sufficiently large to cover the surrounding inflammation. Take of spermaceti ointment, 6 drachms, prepared calomel, 2 scruples, rectified oil of turpentine, 1 drachm; Mix.

Treatment of corns.

When small in size they are to be removed either by stimulants or escharotics, as the application of nitrate of silver, (lunar caustic) merely by wetting the corn and touching it with a pencil of the caustic, every evening. Previous to this, the skin may be softened by immersion of the feet in warm water.

Another mode.—Rub together, in a mortar, 2 oz. of powder of savine leaves, 1-2 an ounce of verdigris, and 1-2 an oz. of red precipitate, or nitric oxide of mercury. Put some of this powder in a linen rag, and apply it to the corn at bed-time.

Solution for the same.

Dissolve 1 ounce of powdered muriate of ammonia, (sal ammoniac,) in a sufficient quantity of rectified spirit. Apply this mixture to the corn every evening, till completely removed.

Removal by cutting, &c.

If the corn has attained a large size, removal by cutting or by ligature will be proper; if it hangs by a small neck, the latter method is preferable. It is done by tying a silk thread round the corn, and on its removal next day, tying another still tighter, and so on till completely removed. When the base is broad, a cautious dissection of the corn from the surrounding parts, by means of a sharp knife or razor, is necessary. This is done by paring gently, until the whole is removed. *In all cases of cutting corns, the feet ought to be previously washed, as in case of making a wound in the toe, great danger may result from want* *of cleanliness in this respect. Mortification has in some instances been the effect of such neglect.*

Prevention, &c.

Corns should be secured from pressure by means of a thick adhesive plaister, in the centre, of which a hole has been made for the reception of the projecting part. This, with frequent immersion in water, and occasional paring, has often been found to remove them; and always prevents their enlargement. An effectual mode of extirpation is by the application of a small blister; the effect of which will be, generally, to raise them, with the skin, out of their bed. When rest from labour can be obtained, this is an excellent method. Dress the blister (which need not exceed the size of a silver sixpence) with hog's lard, or simple wax ointment.

Corn salve.

Take of white diacolon plaister, 4 oz. shoemaker's wax, 4 do. muriatic acid or spirit of salts, 50 drops; boil these ingredients for a few minutes in an earthen pipkin, and when cold, roll the mass out between the hands, or upon a marble slab, slightly moistened with olive oil.

To remove warts.

Nitrate of silver (lunar caustic) cures those troublesome excrescences, called warts, in an extremely simple and harmless manner.

The method of using it is, to dip the end of the caustic in a little water, and rub it over the warts. In the course of a few times, by so doing, they will be gone. The muriate of ammonia (sal ammoniac) is likewise a very useful remedy. "Out of twenty years' practice," says a medical corrrespondent in the Monthly Magazine, "I never knew the above remedies to fail."

Treatment of the Piles.

For this very disagreeable and inconvenient disorder, it will be necessary to take gentle laxative and purgative medicines; as sulphur, cream of tartar, and confection of senna; but the patient must avoid drastic purgatives, and above all *aloes* in any shape. The following, called sulphur confection, will be found to be, perhaps, the best medicine that can be prescribed for this complaint.

Mix together in a glass or marble mortar, 1-2 an oz. of sulphur, 2 oz. of confection of senna, 3 drachms of saltpetre in powder, and as much syrup of orange as will give the whole a proper consistence. One or two drachms of this, or a piece of the size of a nutmeg, is to be taken twice or thrice a day, so as to keep the bowels open.

Ointment for the same.

Rub well together in a mortar, 1 oz. of spermaceti ointment, and 1 drachm of tincture of opium. Apply this ointment night and morning, to the parts immediately after a a plentiful ablution with cold water.—When the tumours are much inflamed, and very painful, the application of leeches will be proper; also refrigerant lotions, as very dilute solution of sugar of lead with laudanum, in the proportion of 4 oz. of the former, to 1-2 an oz. of the latter. Fomentations, sometimes, are of great use in alleviating pain, also the steam of warm water. The best fomentation will be found to be decoction of poppies. To obtain the benefit of steam, the patient must sit over a tub or pan, into which hot water has been poured.

Another.—When the piles are relaxed and irritable, fomentation of oak-bark, and the frequent affusion of cold water, will be necessary. The following ointment is also an excellent application, to be applied every night, and in the intervals of fomentation.—Rub together, in a marble or glass mortar, 1-2 a drachm of camphor, 2 drachms of powdered gall-nuts, and 1 oz. of fresh lard.

Ward's paste for the piles.

Pulverize finely, in an iron mortar, 1 oz. of black pepper, 1 oz. of elecampane-root, and 3 oz. of fennel seed, and mix them intimately together. Now melt together, over a clear fire, 2 oz. of sugar, and 2 oz. of clarified honey, so as to form a clear syrup, which add to the mixed powder in the mortar, and heat the whole into a mass of uniform consistence. This medicine is to be taken, when the irritation of piles runs so high as to threaten *fistula*. The dose is a piece of the size of a nutmeg, to be taken three times a day; this is to be washed down by a glass of cold water, or white wine.

Lotion for the same.

Take of vitriolated zinc, 1 drachm, copper, 6 grains; rub these in a mortar, and add of pure water, 8 ounces; inject about an ounce (lukewarm) by means of a four-ounce lavement syringe, with a *small* rectum pipe.

In many cases the external application of it will succeed. To allay itching about the seat of the disease, this lotion will answer after other cooling and alterative applications have failed. The decoction of oak bark is also an excellent remedy for piles. As piles are generally of a critical nature, astringent applications should never be employed till the disease is rendered local, either by an abstraction of blood, or a mild cooling purgative medicine. If the patient be subject to a determination of blood to the head, or predisposed to apoplexy, both these remedies will be necessary.

Inflammation of the ear.

Water, as warm as the patient can bear, is frequently to be poured into the passage of the ear; or a small portion of soft wool, dipped in a decoction of chamomile flowers, may be introduced into the cavity, as far as it will go. An injection of warm soap and water will also be occasionally beneficial.

Accumulation of wax in the ear.

To remedy this, which is a very frequent cause of deafness, introduce a small piece of cotton wool, upon which a little oil of almonds has been dropped, into the ear, and let it remain there for a day or two. Then syringe the ear with a little warm milk and water, or a solution of soap, or with a solution of common salt in water in the proportion of 2 drachms of the former, to 1-2 an oz. of the latter. Dr. Haygarth states, that this solution of salt is the best solvent of accumulated wax in the ear.

Deficiency of wax.

Deafness is sometimes the consequence of a morbidly dry state of the inner passages of the ear. In such cases introduce a bit of cotton wool dipped in an equal mixture of oil of turpentine and oil of almonds, or in the liniment of carbonate of ammonia, mentioned in another place.

Extraneous bodies in the ear.

These are to be extracted by means of a small forceps, or by syringing the ear with warm or tepid water. But should such means prove unsuccessful, they may be suffered to remain without danger, if they do not produce pain, as in a very short time they will be forced out by the accumulating wax. Insects may be killed by filling the ear with oil, and afterwards removed by syringing with warm water.

Deafness in old persons.

This is usually accompanied with confused sounds, and noises of various kinds in the inside of the ear itself. In such cases, insert a piece of cotton wool, on which a very little oil of cloves or cinnamon has been dropped; or which has been dipped in equal parts of aromatic spirit of ammonia and tincture of lavender. The ear-trumpet ought likewise to be occasionally used.

Indian cure for the ear-ache.

Take a piece of the lean of mutton, about the size of a large walnut, put it into the fire, and burn it for some time, till it becomes reduced almost to a cinder; then put it into a piece of clean rag, and squeeze it until some moisture is expressed, which must be dropped into the ear as hot as the patient can bear it.

Bleeding at the nose.

When this occurs without violence, it is generally an effort of nature to relieve the body from a superabundant portion of blood; but when it becomes habitual, or when it is the result of a blow or other violence, it ought to be put a stop to, as soon as possible. The best means are the introduction into the nostril, by means of a probe, of a small piece of surgeon's lint, or soft linen, previously dipped in a solution of alum, white vitriol, or even cold water. This will in almost all cases, put an immediate stop to the hæmorrhage.

To check hæmorrhage consequent on the extraction of teeth.

Mr. Cullen, Sheerness, recommends the following method for the treatment of the above frequent, and sometimes serious, accident:—"Take a small, fine, vial cork, of a size adapted to the socket whence the tooth has been extrated and the hæmorrhage proceeds; then, with a small dossil of lint, wet with aqua styptica, solution of sugar of lead, and put on the smallest end of the cork, push the cork into the bleeding orifice, pressing it firmly in, till it be, as it were, wedged in the socket; and keep it there as long as may be necessary, desiring the patient to press against it with the teeth of the opposite jaw till the bleeding be stopped, which it is almost instantly. This acts as a tourniquet, and gives time to use whatever other means may be deemed requisite; but it is seldom that any thing else is required."

Remedies for diseases of the teeth.

If hollow or decayed, apply compound tincture of benjamin, or some essential oil, on cotton, to the part; or pills with camphor and opium; or chew the roots of pellitory of Spain. Some burn the nerve with vitriolic or nitrous acid, or a hot iron.—*Medical Pocket Book.*

Another remedy.—Take the inside of a nut gall, and put a small piece into the hollow tooth, which is to be removed and replaced by another bit, about every half hour, as long as white matter comes away with the piece taken out. The above has been found not only a temporary but a permanent cure.

Another.—The following has been found very beneficial in allaying the tooth-ache: Take of tincture of opium, rectified spirit of wine, each 3 oz. camphor, 6 drachms, opium, powdered, 1 1-2 do. pellitory of Spain 1-2 oz. Macerate for eight days. A small piece of lint or cotton is to be dipped into the tincture, and placed in the cavity of the affected tooth.

Another.—Take a sheet of common writing paper, fold it into a conical form, and set the larger end of it on fire, collect the smoke (which will issue copiously from the smaller end,) in a clean silver spoon, and, when the paper is wholly consumed, a small quantity of oil will be found in the spoon. Then make a pellet of convenient size, and, having caused it to absorb as much of the oil as will saturate it, put it carefully into the carious tooth.

Especial care must be taken that the pellet is not too large, for if that circumstance be not attended to, in forcing the pellet into the tooth, great part will be squeezed out.

Another.—The well-known lady-bird *coccinella septempunctata*, possesses a peculiar virtue against the tooth-ache. "I was induced (says Dr. Frederick Hirsoh, dentist to several German Courts,) to collect some of those insects, and, on repeated trials, I found it to exceed my expectations, and I was so happy as to cure several persons speedily and completely with this small insect; finding myself obliged to repeat the remedy only in the cases of a few female patients. My method of proceeding was as follows: I crushed the insect between my thumb and fore-finger, and rub it between them till their points grew warm. With the fore-finger and thumb thus prepared, I then rubbed both the affected part of the gum and the aching tooth; upon which, the pain, in every instance, except in the cases mentioned above, completely ceased. I found, likewise, that the medicinal virtue of this insect was so powerful and durable, that my fore-finger was capable of removing the tooth-ache for some days after, without crushing an insect on it afresh. It is not to be expected, however, that this insect, when preserved dead, should produce the like effect; as then its internal parts in which its virtue may be presumed chiefly to reside, are wholly dried up, leaving nothing but the wings and an empty shell."

Another.—Take a clean tobacco-pipe, place the bowl of it in the fire till red hot, put two or three pinches of henbane-seed into the bowl, over which put the broad part of a common funnel, the tube of the funnel against the tooth affected, so that the smoke arising from the seed may enter. As often as the pipe gets cold, heat it afresh, and put in more seed: continue this for about a quarter of an hour, and the pain, if not allayed immediately, will soon cease. This is a certain cure (at least a relief for some years) for the tooth-ache. The seed may be bought at any seed shop, and two pennyworth of it will serve for twenty people. Care should be taken that the person, after the performance of this operation, does not take cold; in order to prevent this, it had better be performed shortly before the patient retires to rest.

Collyria, or eye-waters.

Take of extract of lead, 10 drops, rose-water, 6 ounces. Mix, and wash the eyes night and morning.

Another.—Take of extract of lead, 10 drops, spirit of camphor, 20 drops, rose-water, half a pint. Mix. This eye water is extremely useful in ophthalmia, attended with much inflammation.

Another.—Take of opium, 10 grains, camphor, 6 grains, boiling water, 12 ounces; rub the opium and camphor with the boiling water, and strain. This collyrium abates the pain and irritation attendant on severe cases of inflammation of the eyes.

Another.—Take of white vitriol, 1-2 drachm, spirits of camphor, 1 drachm, warm water, 2 ounces, rose-water, 4 ounces. Dissolve the vitriol in the warm water, and add the spirit of camphor and rose-water. This is an useful collyrium in the chronic state of ophtalmia, or what is generally called weakness of the eyes, after inflammation.

Another.—Dissolve 10 grains of soft extract of opium in 6 oz. of warm distilled water; strain through fine linen, and then add 2 oz. of liquor of acetate of ammonia. Where the pain is great, this cyllyrium will be productive of great relief.

Another.—Make a lotion for the inflamed eyes with 20 drops of tincture of camphor, 10 drops of solution of sugar of lead, 1 of Goulards extract, and 7 ounces of distilled water. If the pain is very distressing, a drop of the vinous tincture of opium, may be conveyed twice a day into the eye, by means of a feather. This is an effectual means of obtaining relief.

Another.—Mix together one ounce of the liquor of acetate of ammonia, and 7 ounces of distilled rose-water.

Another.—When the eye is merely weak, frequent ablution with cold water, either in a basin or by means of an eye-cup, of green glass, will be of great use. At night a very cooling cataplasm, or poultice, may be made of crumb of bread soaked in a pint and a half of cold water, in which a drachm of alum has previously been dissolved. This is to be applied over the eyes in a handkerchief when going to bed.

Another.—Take of vitriolated zinc, 10 grains, distilled vinegar, 2 drachms, rose-water, 14 ounces. Make into a wash for the eyes, and apply this frequently. This is used when the eye-lids are greatly tumefied, and has performed wonders in that complaint.

Another.—Take of vitriolated zinc, 2 grains, rose-water, 7 ounces. Pour some of this lotion into cups; have a piece of rag in each cup, and keep the wet rag to the diseased eye. When this is warm, remove it, and take the cold rag from the other cup, and so apply the lotion cold. Even rose-water by itself is very useful for strengthening the eyes, and its smell is very reviving and grateful.

Another.—The following lotion is recommended, as a topical application in cases of external inflammation, particularly of the eye, urethra, and ear. Take of acetate of lead, ditto of zinc, each 5 grains, distilled water, 8 ounces. Mix.

For weak sight.

Beat up a drachm of alum in the white of an egg, and smear the eye-brow and eye-lid with the mixture every night.

For inflammation of the eye-lids.

The following ointment has been found exceedingly beneficial in inflammations of the eye-ball and edges of the eye-lids, which are become very prevalent in the metropolis. Take of prepared calomel, 1 scruple, spermaceti ointment, 1-2 ounce. Mix them well together in a glass mortar; apply a small quantity to each corner of the eye, every night and morning, and also to the edges of the lids, if they are affected. If this should not eventually remove the inflammation, the following lotion may be applied three or four times a day, by means of an eye-cup. The bowels should be kept in a laxative state, by taking occasionally a 1-4 of an ounce of the Cheltenham or Epsom salts.

Lotion to be used at the same time.

Take of acetated zinc, 6 grains, rosewater, (fresh) 6 oz. Mix. Before the ointment is applied to the corners of the eyes, wash them with this lotion. These remedies have uniformly succeeded in every case of inflammation of the eyes to which they have been applied.

Treatment of styes.

These are small abscesses seated in the edge of the eyelid, and produced from the obstruction of very minute glands. They are often attended with much heat and pain, and always with great inconvenience. If they do not suppurate quickly, a small poultice of bread and milk is to be applied warm. When the matter is formed, an opening should be made with the point of a lancet, and a small portion of weak citrine ointment is afterwards to be applied.

Eye snuff.

Grind and mix well in a marble mortar 5

grains of sulphate of mercury, and 40 grains of the powder of liquorice root. A pinch of this, now and then, that is not exceeding once or twice a day, will cause considerable discharge from the nose and gives great relief in inflammation of the eyes.

PURGATIVE MEDICINES.

Infusion of senna.

Take of senna, 3 drachms, lesser cardamon seeds, husked and bruised, 1-2 do.; boiling water, as much as will yield a filtered infusion of 6 ounces. Digest for an hour, and filter, when cold.

This is a well contrived purgative infusion, the aromatic correcting the drastic effects of the senna. It is of advantage that it should be used fresh prepared, as it is apt to spoil very quickly.

Tartarized infusion of senna.

Take of senna, 1 1-2 oz. coriander seeds, bruised, 1-2 ounce, crystals of tartar, 2 drachms, distilled water 1 pint: Dissolve the crystals of tartar by boiling in the water: then pour the liquor, as yet boiling, on the senna and seeds. Macerate for an hour, in a covered vessel, and strain when cold. The addition of the crystals of tartar renders the taste of the senna less unpleasant, and also promotes its action. The quantity to take as a purge, is from 1-2 an ounce to 1 ounce, early in the morning.

Electuary of senna.

Take of senna, 8 ounces, coriander seeds, 4 ounces, liquorice, 3 ounces, figs, 1 lb. pulp of tamarinds, cassia fistula, and prunes, of each 1-2 lb. double refined sugar, 2 1-2 lbs. Powder the senna with the coriander seeds, and sift out 10 oz. of the mixed powder; boil the remainder with the figs and liquorice, in 4 lbs. of water, to one half; express, and strain the liquor, which is then to be evaporated to the weight of about 1 1-2 lb.; dissolve the sugar in it; add this syrup, by degrees, to the pulps; and, lastly, mix in the powder.

This electuary is a very convenient laxative, and has long been in common use among practitioners. Taken to the size of a nutmeg, or more, as occasion may require, it is an excellent laxative for loosening the belly in costive habits.

Compound colocynth pills.

Take of pith of colocynth, cut small, 6 drachms; hepatic aloes, 1 1-2 oz. scammony 1-2 oz. lesser cardamon seeds, husked and bruised, 1 drachm: Castille soap, softened with warm water, so as to have a gelatinous consistence, 3 drachms; warm water, 1 pint. Digest the colocynth in the water, in a covered vessel, with a moderate heat, for 4 days. To the liquor, expressed and filtered, add the aloes and scammony, separately, reduced to powder; then evaporate the mixture to a proper thickness for making pills, having added towards the end of the evaporation, the soap-jelly and powdered seeds, and mix all the ingredients thoroughly together.

These pills are much used as warm and stomachic laxatives; they are well suited for costiveness so often attendant on people of sedentary lives, and, upon the whole, are one of the most useful articles in the materia medica.

Aloetic pills.

Take of socotrine aloes, powdered, 1 oz. extract of gentian, 1-2 oz. oil of caraway seeds, 2 scruples; syrup of ginger as much as is sufficient. Beat them together. The dose is about 10 grains.

Compound aloetic pills.

Take of hepatic aloes, 1 oz. ginger root, in powder, 1 drachm, soap, half ounce, essence of peppermint, half drachm. Powder the aloes with the ginger,, then add the soap and the oil, so as to form an intimate mixture. This is an excellent purge for costive habits, in the dose of from 5 to 10 grains.

Compound rhubarb pills.

Take of rhubarb, in powder, 1 ounce, socotrine aloes, 6 drachms; myrrh, half ounce, volatile oil of peppermint, half drachm. Make them into a mass, with a sufficient quantity of syrup of orange peel. These pills are intended for moderately warming and strengthening the stomach, and gently opening the belly. A scrup. of the mass may be taken night and morning.

Purgative powder, formerly called hiera picra.

Take of socotrine aloes, 1 lb. white canella, 3 ounce. Powder them separately and then mix them. The spicy canella acts as a corrigent to the aloes; but the compound is more adapted to be formed into pills than to be used in the state of powder. It is a convenient medicine for costive habits, not subject to the piles. Dose from 10 grains to a scruple at bed time.

Mild purgative emulsion.

Take of manna and oil of almonds, each 1 ounce, prepared kali, 12 gr. cinnamon and rose water, each 3 ounces. Mix carefully the oil, kali, and manna together, gradually pouring the liquids to form an emulsion, of which take 2 table spoonsful night and morning.

Electuary for the piles.

Take of the electuary of senna, 1 1-2 ounces, washed flowers of sulphur, 4 drachms, vitriolated kali, in powder, 1 do. syrup of roses, as much as is sufficient. Make into an electuary, of which take the size of a nutmeg, going to bed, as may be required. This is an excellent remedy for persons who have the piles, or are subject to their return.

Croton pills.

Dr. Coley, of Cheltenham, prescribes croton oil in conjunction with Castille soap and an aromatic. This composition sits pleasantly on the stomach, and operates efficaciously on the intestinal canal. The following formula has been found very efficacious in cases of obstinate costiveness: Take of Castille soap, 1-2 drachm; oil of the seeds of the croton tiglium, oil of cloves, each 9 drops. After being well blended in a marble mortar, and formed into a proper mass with liquorice powder, it is to be divided into 10 pills, two of which may be administered for a dose. If this quantity should not operate sufficiently on the bowels in the course of 6 hours, one or two more may be given. The root of the tiglium is considered, by the native doctors of Amboyna and Batavia, to be a specific for dropsy. In the *Materia Medica* of Hindostan, as much of the shavings, or raspings, as can be taken up by the thumb and finger, is directed to be taken for a dose. The root is both aperient and diuretic.

Castor oil draught.

Take of castor oil, 4 drachms, the yolk of an egg: accurately mix them together; add cinnamon water, 1 1-2 ounces. Make into a draught to be taken immediately. This is a useful and pleasant purge.

Castor oil clyster.

Take of castor oil, 2 ounces; 1 egg; mix them well, and then add gruel, 8 ounces; which will operate very mildly, and is efficacious in case of worms.

Purging clyster.

Take of manna, 1 ounce. Dissolve in 10 ounces, by measure, of compound decoction of chamomile; then add of olive oil, 1 ounce, sulphat of magnesia, 1-2 ounce. Mix and let it be given directly.

REMEDIES FOR COUGHS AND COLDS.

Candied horehound.

Boil some horehound till the juice is extracted. Boil up some sugar to a feather, add the juice to the sugar, and let it boil till it is again the same height. Stir it with a spoon against the sides of the sugar pan, till it begins to grow thick, then pour it into a paper case that is dusted with fine sugar, and cut into squares. Dry the horehound, and put it into the sugar, finely powdered and sifted. Small pieces are put into the mouth. This certainly greatly tends to allay irritation, and probably the bitter may have some good effect in bracing the stomach, and hence the whole system.

Opium lozenges.

Take of opium, 2 drachms; tincture of tolu, 1-2 ounce, common syrup, 8 ounces, extract of liquorice, softened in warm water, gum arabic, in powder, each 5 ounces. Triturate the opium well with the tincture, then add, by degrees, the syrup and extract; afterwards gradually mix the powdered gum arabic. Lastly, dry them so as to form a mass to be divided into lozenges, each weighing 10 grains. These directions are so full and particular, that no further explanation is necessary; seven and a half contain about 1 grain of opium. These lozenges are medicines of approved efficacy, in tickling coughs, depending on irritation of the fauces. Besides the mechanical effect of the viscid matters, in involving acrid humours, or lining and defending the tender membranes, the opium, no doubt, must have a considerable effect, by more immediately diminishing the irritability of the parts themselves. One of these is to be occasionally taken during the day, to allay a tickling irritation in the throat.

Liquorice lozenges, with opium.

Take of opium, 2 drachms, tincture of tolu, 1-2 ounce, common syrup, 8 ounces, extract of liquorice, softened in warm water, gum arabic, in powder, each, 5 ounces. Triturate the opium well with the tincture, then add by degrees the syrup and extract; afterwards gradually mix the powdered gum arabic; lastly, dry them so as to form a mass, to be divided into lozenges, each weighing 10 grains.

Paregoric elixir, or camphorated tincture of opium.

Take of hard purified opium, in powder, benzoic acid, each, 1 drachm, camphor, 2 scruples, essential oil of aniseed, 1 drachm, proof spirit of wine, 2 pints. Digest for 10 days and strain. In this formula, the virtues of the opium and the camphor are combined. It derives an agreeable flavour from the acid of benzoin and essential oil. The latter will also render it more stimulating. It was originally prescribed under the title of Elixir Asthmaticum, which it does not ill deserve. It contributes to allay the tickling which provokes frequent coughing; and at the same time, it opens the breast, and gives greater liberty of breathing. It is given to children against the chincough, &c. in doses of from 5 drops to 20; to adults from 20 to 100. Half an ounce, by measure, contains about a grain of opium.

Extract of malt.

The following method of making the extract of malt, has been found very efficacious, in allaying a troublesome cough, and in spitting of blood; and, if taken in time, would prevent a pulmonary consumption. Let a peck of the best malt be ground and put into an earthen pan; pour 6 quarts of boiling water over it, stir it well and cover it up close. Let it stand 28 hours; after which strain it through a clean coarse cloth; then put it into a preserving pan over a gentle fire stirring and skimming it all the while. Let it boil till it comes to a syrup that ropes, and is as thick as treacle. Put it into galley-pots, and when cold cover it up close. A tea-spoonful of this may be taken in a morning, fasting, and at night going to bed; and at other times when the cough is troublesome.

Expectorant pills

Take of dried root of squills, in fine powder, 1 scruple, gum ammoniac, lesser cardamon seeds, in powder, extract liquorice, each 1 drachm. Form them into a mass with simple syrup. This is an elegant and commodious form for the exhibition of squills, whether for promoting expectoration, or with the other intentions to which that medicine is applied. The dose is from 10 grains to 1 scruple, three times a day.

Napoleon's pectoral pills.

The following recipe was copied from one in the possession of the late Emperor of France, and was a very favourite remedy with

Napoleon for difficulty of breathing or oppression of the chest, arising from a collection of mucus in the air cells and vessels of the lungs, and in the gullet. Considerable benefit has been derived from them in many similar cases. Take of ipecacuanha root, in powder, 30 grains, squill root, in powder, gum ammoniac, do. each 2 scruples, mucilage of gum arabic, sufficient to form a mass. To be divided into 24 pills; 2 to be taken every night and morning.

Dr. Ratcliffe's cough mixture.

Mix together, 4 drachms of syrup of squills, 4 drachms of elixir of paregoric, 4 drachms of syrup of poppies. Of this, take a tea-spoonful in a little tea or warm water as occasion requires.

Dr. Munro's cough medicine.

Take 4 drachms of paregoric elixir; 2 drachms of sulphuric ether; 2 drachms of tincture of tolu. Mix, and take a tea-spoonful night and morning, or when the cough is troublesome, in a little milkwarm water.

Simple remedy for coughs.

Take of boiling water, 1-2 a pint, black currant jelly, a dessert spoonful, sweet spirit of nitre, a tea-spoonful. Mix the jelly in the water first, till it is quite dissolved, and add the nitre last. Take a dessert spoonful of the mixture at night, going to bed, or when the cough is troublesome. The mixture should be made and kept in a tea-pot, or other covered vessel.

Remedy for chronic cough.

The following is very serviceable in common obstinate coughs, unattended with fever. Take of tincture of tolu, 3 drachms, elixir of paregoric, 1-2 an ounce, tincture of squills, 1 drachm. Two tea-spoonsful to be taken in a tumbler of barley-water, going to bed, and when the cough is troublesome.

For coughs in aged persons.

In the coughs of aged persons, or in cases where there are large accumulations of purulent or viscid matter, with feeble expectoration, the following mixture will be found highly beneficial: Pour gradually 2 drachms of nitric acid, diluted in 1-2 a pint of water, on 2 dr. of gum ammoniac, and triturate them in a glass mortar, until the gum is dissolved. A table spoonful to be taken, in sweetened water, every two or three hours.

For recent cold in the head.

Take of laudanum, 25 drops, sweet spirit of nitre, 1 drachm, antimonial wine, 40 drops, water, 1-2 ounce. To be mixed and taken at bed-time, the patient drinking freely afterwards of warm water-gruel, barley-water, or whey. In common colds, and recent cough, the above will often remove the complaint; but if it be attended with much pain, or soreness of the chest, or difficulty of breathing, 12 or 14 ounces of blood should be lost previously.

For recent cough.

Put a large tea cupful of linseed, with 1-4 lb. of sun raisins, and 2 ounces of stick liquorice, into 2 quarts of soft water, and let it simmer over a slow fire till reduced to 1 quart: add to it 1-4 lb. of pounded sugar-candy, a table-spoonful of old rum, and a table-spoonful of the best white wine vinegar, or lemon juice. The rum and vinegar should be added as the decoction is taken; for, if they are put in at first, the whole soon becomes flat, and less efficacious. The dose is half a pint, made warm, on going to bed; and a little may be taken whenever the cough is troublesome. The worst cold is generally cured by this remedy in two or three days; and, if taken in time, is considered infallible.

Cough emulsion.

Take of oil of almonds, 6 drachms, milk of do. 5 ounces, rose water, gum arabic, and purified sugar, equal parts, 2 dr. Let these be well rubbed together, and take 2 table-spoonsful four times a day, and a tea-spoonful upon coughing. This is far preferable to the common white emulsions formed by an alkali, which uniting with the oil produces a kind of soap, and readily mingling with water, forms the white appearance observed, and is commonly disgusting to patients and unpleasant to the stomach; whereas this suits every palate, and removes that tickling in the throat so very distressing to patients.

Another.—Take of spermaceti, dissolved in the white of an egg, 1 scruple, syrup of tolu, 2 drachms, cinnamon water, 3 do. milk of almonds, 11 do. Make into a draught, to be taken four times a day.

Emulsion for a cold, &c.

Take of milk of almonds, 1 ounce, syrup of tolu, 2 drachms, rose water, 2 do. tincture of squills, 16 drops. Make into a draught. Four to be taken during the day. This is an admirable remedy in colds, and also in consumptions, as well as in asthma.

Gargle for thrush.

Thrush, or aphthæ in the mouth will be greatly benefited by the frequent use of the following gargle. Mix together 20 drops of muriatic acid (spirit of salts,) 1 ounce of honey of roses, and 4 ounces of decoction of barley.

Another.—Make a gargle of 2 dr. of borax, 1 ounce of honey of roses, and 7 ounces of rose water. To be used three or four times a day.

Gargle for sore throat.

Take of decoction of bark, 7 ounces, tincture of myrrh, 2 drachms, purified nitre, 3 do. Make into a gargle. This is a sovereign method to disperse a tumefied gland, or common sore throat. By taking upon such occasions a small lump of purified nitre, putting it into the mouth, and letting it dissolve there, then removing it, and applying it again in a few seconds, and swallowing the saliva, I have, says Dr. Thornton, for many years prevented a sore throat from forming.

For putrid sore throat.

Take of decoction of bark, 6 ounces, diluted vitriolic acid, 1 drachm, honey of roses, 1 oz. Make into a gargle; to be used, mixed with port wine, frequently during the day.

For inflammatory sore throat.

Take of nitre, 2 drachms, honey, 4 do. rose water, 6 oz. Mix. To be used frequently.

Another.—Take of spirit of salts, 20 drops, honey of roses, 1·2 oz. water, 4 do. Mix.

For ulcerated sore throat.

The purified lignic acid, in cases of putrid ulcerated sore-throat, has been attended with the most decisive sueeess. Its internal exhibition more effeetually allays thirst, and abates fever, than any other acid; and when applied as a gargle to inflamed or ulcerated sore throats, it has been found to disperse the inflammation and to deterge the ulcers more effeetually than the infusion of rose leaves, with the sulphuric acid, the gargle generally resorted to in those eases. The eoncentrated aeid may be given in the dose of from 40 to 60 drops in a glass of water three our four times a day. For the purpose of gargling the throat, four draehms of the eoneentrated acid may be added to half a pint of water.

MEDICINE FOR WORMS.

The male fern.

The root of male fern has long been esteemed a powerful remedy for worms; and its powder has been sold under a fietitious name, as an infallible specifie for the broad or tapeworm. Sometimes it has been ordered to be taken without any mixture; at other times gamboge, seammony, mereury, and other purgative medicines, have been ordered to be taken with it.

In the year 1755, the late king of France purchased, for a large sum of money, the recipe of a medicine whieh was said to be an effeetual eure for the tape-worm, from the widow of a surgeon in Switzerland, whose husband used to administer it. On diseovery it proved to be fern root, redueed to powder, which is to be taken in the following manner: The day before the patient is to begin to take the fern, he is to take a dose of some opening medicine, and after its operation to make a very light supper; next morning he is to take 3 drachms of the powder of the fern-root, in a cup of lime-flower water, and after it a little orange-peel, or some other grateful aromatie; and if he vomits it up, to take soon after another full dose of the powder of the fern-root. Two hours after this is swallowed, the following purging powders are to be taken, viz. 12 grains of resin of scammony, mixed with as much of the panacea mereurialis, (calomel digested in spirit of wine,) and 5 grains of gamboge, in powder; the dose being made stronger or weaker, according to the strength of the patient. Soon after taking the dose, the patient is to drink tea, and as soon as the physic begins to operate, if he perceives that the tænia is eoming away, he is to remain on the close-stool till it has entirely passed; if the purgative should prove too weak, the patient is to take a dose of Epsom salts, and to drink freely of broth. If the first dose of the fern powder, and of the purging medicine, has not the desired effect, the powder and purge are to be repeated next day; and if at any time the tænia is observed to be coming away, the greatest care must be taken not to break it.

Cowhage.

The usual way of preparing and administering cowhage, is in the form of an electuary, with honey, molasses, or syrup of a thick consistence. After repeated trials and experiments, in the eourse of 25 years, made with a view of finding out the best vehiele for this substance, none has been found less exceptionable than the good old vehicle, eommon treacle. Conserves have been tried, but children eannot be prevailed on so readily to take them. There are these advantages in treaele; 1st, every body knows what it is: 2dly, there are few ehildren who do not like it: 3dly, it is not apt to be spoiled, or to ferment, unless kept in too warm a place: and, lastly, it is gently aperient, and, in that view, an auxiliary to the principal ingredient. But if, from a dislike to treaele, some other vehicle should be preferred, raspberry jam, or eurrant jelly, will prove very good substitutes.

Of this electuary a tea-spoonful is a suffisient dose for ehildren, from infaney to the age of six or eight; from thence to fourteen, a dessert spoonful; and for all above that age, a table-spoonful. To be taken twiee a day, viz. at night, going to bed, and in the morning, an hour before breakfast.

The cowhage, after being begun upon, is to be eontinued for 3 or 4 days, after which some brisk purgative is to be taken, whieh will, in general, bring away the worms, if there be any. Afterwards the cowhage is to be continued as long as there may seem oeeasion, repeating the purgatives at intervals of 3 or 4 days.

For the tape-worm, the cowhage is not so effeetual as against other worms. In very obstinate eases it has been found necessary to increase the quantity of cowhage threefold; for the worms will not easily let go their hold, which they are as tenaeious of as they are of life.

Worm seed.

Worm seed is one of the oldest and most common anthelmintics; especially in the lumbrici of children. On account of their essential oil, they are heating and stimulating. They are given to children to the extent of 10 grains, or half a draehm, finely powdered, and strewed on bread and butter: or made into an electuary with honey or treacle; or candied with sugar; or diffused through milk, and taken in the morning when the stomach is empty. After they have been used for some days, it is customary to give a cathartic; or they are combined from the beginning with rhubarb, jalap, or calomel.

Anthelmintic wine.

Take half an ounce of rhubarb, and one ounee of worm-seed. Bruise them and infuse 2 pints of red port wine for a few days, then strain off the wine. A glass of this twice or thrice a day is good for persons afflicted with worms.

To destroy ascarides.

Take of socotrine aloes, 2 drachms; new milk, 8 oz. Rub them together for a clyster. This is useful to destroy the ascarides, or little thread-worm.

Electuary for the same.

By persevering some months in the use of the following electuary, that most annoying disease, called *ascarides*, may be perfectly cured. Take of flowers of sulphur, Peruvian bark, in powder, each 1 1-2 oz. carbonate of iron, 2 drachms; jalap powder, 1 drachm; conserve of wormwood, 2 oz. syrup of buckthorn, a sufficient quantity to form an electuary. Increase the dose from 1 to 3 tea-spoonsful, with a wine-glassful of lime-water, once or twice a day, so as to produce two evacuations daily, or three in the course of two days.

Powder of tin.

In a tea-spoonful of honey, or currant jelly, mix a drachm of powder of tin, and take it twice a day for six successive mornings and evenings, making altogether 12 drachms, or 1 1-2 oz. of the tin. A little rhubarb, or any mild aperient medicine, may be taken each alternate night of the six. This is the quantity for an adult person, but would not prove too much for a child, we apprehend, as the tin does not act upon the bowels, but upon the worm itself.

General remedy for worms.

The essential oil of petroleum, (naphtha,) has been employed for upwards of fifty years, in Italy, as a remedy for every species of worms lodged in the intestinal canal. The oil of turpentine, in its chemical properties, is similar to naphtha. Petroleum is become so abundant in this country, in consequence of the general adoption of the gas-lights in the metropolis, (the production of it from the decomposition of coal being very considerable,) that the oil of it, obtained by distillation, is employed to adulterate oil of turpentine. As a remedy for worms it is unquestionably more effectual than the latter.

Oil of turpentine.

Dr. Gibney, of Cheltenham, observes, that the oil of turpentine, is almost a specific in *every* species of worms, and its failure, in the practice of many physicians, he attributes to the improper exhibition of it. When the dose is not sufficiently large, it affects the kidneys and skin, and produces no effect on the worm, or intestinal canal. He prescribes 1 or 2 drachms, at intervals, for children of 3 years of age, and 6 drachms for older children, and more for adults. He directs it to be taken when the stomach is most empty, and enjoins strict abstinence during its use. Begin with a good dose early in the morning, and repeat it every hour for three or four hours, as circumstances may indicate. Combine with it mucilage of gum arabic, simple cinnamon water and syrup. And, in case it should not operate on the bowels as an aperient, take a dose of castor oil. This treatment is renewed about every 4 or 5 days, for some time after the evacuation of worms, or until the fæces become healthy.

Essence of bergamot.

An Italian physician, of great eminence, has found the "*essentia de cedra*," (essence of bergamot,) in the dose of one or two drachms, (mixed with honey,) more efficacious in destroying the tape, and also the long round worm, than the oil of turpentine or naphtha.

Balm leaves.

Dr. Mongeny, physician to the hospital of the colony Fernandina, in the isle of Cuba, has found the leaves of the herb *balm*, made into a paste, to succeed in expelling the tape-worm, from the human intestine, in the course of a few hours. He advises 3 ounces of the paste, (made of fresh balm powder, and sufficient quantity of honey,) to be given to the patient fasting, and afterwards 6 ounces of honey, in three doses; the first at the end of an hour, and the other after similar intervals. By this process the tape-worm has always been expelled after the lapse of 6 or 7 hours; and in many of the cases all the other medicines of repute had been unsuccessfully tried. The worm is voided knotted into a ball, and not by piece-meal, as is commonly the case when removed by vermifuge purgatives.

For tape worm in children.

Beat up 5 1-2 drachms of rectified oil of turpentine, with the yolk of an egg, and some sugar and water, or common syrup. Give this to a child having tape-worms. Two doses are sure of expelling them.—*Dr. Letsom.*

For the long round worms.

Take of tartarian southernwood seed, bruised, tansy seed, ditto, of each 1 oz. Valerian root, powdered, 2 drachms; jalap root, ditto, 1-2 drachm, sulphate of potass, 1 1-2 ditto, oxymel of squills, sufficient to form an electuary. A dessert-spoonful is to be taken morning and evening.

Mare's milk.

The German physicians have remarked the good effects of mare's milk as a remedy against the round or solitary worm. A woman between thirty and forty had been long afflicted with the solitary worm, and no remedy had succeeded. Having learnt that many persons had been cured by simply drinking mare's milk, freshly drawn, she took two cupsful in the evening; soon afterwards she experienced violent pains in the intestines, which lasted nearly the whole night. The next morning she took another cupful; the pain recommenced, but not so violent as before. In a few days she voided a large portion of worm, dead and half putrid, and shortly afterwards, another portion with the tail: from that moment every symptom of disease ceased. This virtue of mare's milk is the more remarkable, as cow's milk seems to be agreeable to the worm, and, being drank, augments the symptoms.

Ching's worm lozenges.

Efficacious as this domestic medicine is, it is still dangerous in unskilful hands. With this precaution, the composition from which these lozenges are made, is stated as follows:

The yellow lozenges.

Take of saffron, half an ounce: boil it in one gallon of water, and having strained it off, add of calomel, washed in spirits of wine, 12 ounces: white sugar, 28 pounds; mucilage of tragacanth, sufficient to make the mass. Roll this out of a sufficient thickness, so that each lozenge may contain one grain of calomel. If cut of any other shape than square, as round or oval, much of the mass will require making up again and again; it follows, that in the square form, the mass would make 5760 lozenges, whilst the first cutting, in the oval or round, would only produce two-thirds of that number. Dose, from 1 to 6, according to age.

The brown lozenges.

Take of the calomel, (as above,) 7 ounces; resin of jalap, 3 pounds and a half; sugar, nine pounds; mucilage of tragacanth, as much as may be found sufficient to form the mass, which must be cut out into 6720 pills, or lozenges; thus, leaving in each, half a grain of the panacea. The dose of these brown pills is from one to six, according to age and strength. The yellow lozenge is to be taken at night, the brown on the following morning. Cold is to be avoided during the course.

TREATMENT OF INDIGESTION AND DEBILITY.

Cordial confection.

Take of zedoary, grossly powdered; saffron, each half a pound; distilled water, 3 pints. Macerate for 24 hours, then press and strain. Evaporate the strained liquor to a pound and a half; and then add the following ingredients, reduced to a fine powder: compound powder of crabs' claws, 16 oz. cinnamon and nutmeg, each 2 oz. cloves, 1 oz. lesser cardamom seeds, husked, 1-2 oz. double refined sugar, 2 lbs. The dose of this confection is from a scruple to a drachm, in any convenient vehicle, to raise and recruit the spirits. It is often combined with more active ingredients, and enables persons to retain medicines, which otherwise would nauseate the stomach.

Compound tincture of cardamoms.

Take of seeds of lesser cardamons, husked and powdered, caraway seeds, powdered, cochineal, powdered, each 2 drachms; cinnamon, bruised, 1-2 an ounce; raisins, stoned, 4 ounces; proof spirit, 2 pints. Digest for 14 days, and strain. The dose of the compound tincture is from 3 drachms to half an ounce. It is seldom used alone, but joined with more powerful ingredients. In dyspeptic habits, much good has arisen from half a glass taken before dinner, to rouse the nerves of the stomach and aid digestion.

Stomachic elixir.

Take of gentian root, 2 oz. Curacoa oranges, 1 oz. Virginia snake-root, half an ounce, cochineal, half a drachm, French brandy, 2 pints. Let them steep for 3 days and then filter the elixir.

Gentian wine.

Take gentian root and dried lemon-peel, fresh, of each 1 ounce, 2 drachms of long pepper, and 2 pints of mountain wine: infuse without heat for a week, and strain out the wine for use. In complaints of the stomach arising from weakness or indigestion, a glass of this wine may be taken an hour before dinner and supper.

Challybeate wine.

Take 2 oz. of filings of iron, cinnamon, and mace, each 2 drachms, and 2 pints of Rhenish wine. Infuse for 3 or 4 weeks, frequently shaking the bottle, then pass the wine through a filter. This wine is a remedy for obstructions of the menses. The dose is half a wine glass taken twice or thrice a day. Lisbon wine, if sharpened with 1-2 an ounce of cream of tartar, is also beneficial.

Stomachic wine.

Take 1 oz. of Peruvian bark grossly powdered, cardamom seeds and gentian root, bruised, each 2 drachms; infuse in a bottle of white port, or Lisbon wine, for 5 or 6 days, then strain off the wine. This is used in cases of debility of the stomach or intestines, in slow recovery after a fever, or for intermittent fevers. A glassful may be taken 2 or 3 times a day.

Compound infusion of gentian.

Take of gentian root, cut in pieces, 1-2 an oz. dried peel of Seville oranges, bruised, one drachm, coriander seeds, bruised, 1-2 a drachm, diluted alcohol, 4 oz. water, one lb. First, pour on the alcohol, and 3 hours thereafter add the water; then macerate, without heat, for 12 hours, and strain. The dose is 2 or 3 drachms, at 12 o'clock, 7 in the evening, and bed-time, every day, to improve digestion.

Powerful tonic.

Take of decoction of bark, 6 oz. compound tincture of bark, 1 ounce, bark, in powder, 1 drachm, calcined magnesia, 1 do. Form a mixture. Two table spoonsful are to be given three times a day.

For debility of the stomach.

Take of chamomile flowers, lemon peel, orange do. each 4 drachms, boiling water, 1 pint. Let them remain for four hours, and strain. To the strained liquor add syrup of ginger, 6 drachms. The dose is a wine glassful, in the morning early, and repeated an hour before dinner, for habits debilitated by drinking, or natural weakness of the stomach.

Stomachic aperient pills.

The pills made according to the following recipe, have been long prescribed as a dinner pill with success:

Take of rhubarb root, powdered, 1 1-2 dr. Turkey myrrh, 1 do. socotrine aloes, 1-2 do. extract of chamomile flowers, 2 1-2 ditto, essential oil of ditto, 16 drops. Mix well together, and divide into 80 pills. Two or three to be taken about an hour before dinner.

Tonic draught in cases of great debility.

Take of the decoction of bark, 12 drachms, tincture of bark, 1 ditto, syrup of Tolu, 1-2 do.

diluted vitriolic acid, 8 drops. Make into a draught, to be taken three times a day.

For general debility of the system.

Take of jalap powder, nitre powder, each 30 grains, peppermint-water, 1 oz. tincture of jalap, 1 drachm; mix. To be taken in the morning.

Accompanying tonic mixture.

Take of Peruvian bark, bruised, 1 oz. fresh lime, 1-2 ditto. Mix, and pour on them (in an earthen vessel) 1 1-2 pints of water. After standing 3 hours, strain off the liquor, and add to it, tincture of Peruvian bark, 2 oz. sweet spirit of nitre, 3 drachms, syrup of orange peel, 1 oz.; 3 oz. to be taken 3 times a day, beginning in the morning after the operation of the aperient medicine.—These two formulæ were prescribed for Sir John Jervis, Bart., when about 16 years of age, by the late celebrated Dr. John Hutchinson, of Dublin, for debility of the lymphatic system, attended with swelling of the legs. Shortly after, he became completely invigorated and healthy. It was continued for some time, and afterwards repeated at intervals. "Such were its renovating effects," says Sir John, "that it may with truth be denominated the true *aqua vitæ;* for, to me, it laid the foundation of a state of health and strength of constitution which have seldom been surpassed."

Dr. Bailie's prescription for indigestion.

Dissolve 3 drachms of sulphate of magnesia in 1-2 a pint of the infusion of roses (made according to the London Pharmacopœia), and then add 1-2 an ounce of the tincture of cascarilla. Three table spoonsful to be taken twice a day; i. e. between the hours of breakfast and dinner, and in the evening.

Abernethy's prescription for indigestion.

Take of calomel (or sub-muriate of mercury), precipitated sulphuret of antimony, each 1 scruple, powder of gum guaiacum, 2 scruples, Spanish soap, as much as will be sufficient to form into 20 pills, which are to be taken night and morning.

For indigestion and costiveness.

The following remedies for indigestion, attended with heart-burn and costiveness, were prescribed by Dr. Gregory, of Edinburgh. Take of carbonate of potass, 4 drachms, simple cinnamon water, pure water, each 6 oz. compound tincture of gentian, 3-4 ounce. Mix. Three large spoonsful are to be taken twice a day.

Accompanying purgative.

Take of compound pill of aloes, with colocinth, 2 drachms. To be divided into 24 pills, 2 to be taken twice a week.

Dr. Babington's remedy for indigestion attended with costiveness.

Take of infusion of columbo, 6 oz. carbonate of potass, 1 drachm, compound tincture of gentian, 3 ditto. Mix. Three table spoonsful are to be taken every day at noon.

To remove indigestion, flatulency, and pains of the stomach after eating.

Take half a wine glassful of the following mixture a quarter of an hour after dinner:— Magnesia and carbonate of soda, of each 2 dr. spirits of sal volatile, 4 drachms; and distilled or pure water, 1 pint. This also is an excellent cure for heart-burn, and may be taken without injury by the most delicate constitutions. It is also an excellent medicine to promote sleep, for which purpose a wine glassful may be taken at bed-time.

Remedy for flatulency.

Take of bay berries, 6 drachms, grains of paradise, 2 do. socotrine aloes and filings of iron, each 2 scruples, oil of turpentine, 2 dr. simple syrup, sufficient to form an electuary.

Dr. Reese's remedy for flatulence and cramp in the stomach.

Take of carbonate of soda, 1 drachm, compound tincture of rhatany, 1 oz. compound tincture of ginger and chamomile, 3 drachms, camphorated julep, 7 oz.—Mix. Three tablespoonsful are to be taken twice a day.

For night-mare.

The articles of food most likely to produce night-mare, are cucumbers, nuts, apples, and all such things as generally produce flatulence. The paroxysm of night-mare does not always immediately follow the eating any improper food, but sometimes several days elapse before its attack. In this case it is easier to foresee, and consequently to prevent it. The signs by which its approach may be known are, unusual drowsiness, disagreeable dreams and disturbed sleep, with wind in the stomach and bowels. In this case immediate recourse should be had to the carbonate of soda, or to either of the following draughts, which may be taken at bed-time:—Mix together 10 grains of carbonate of soda, 3 drachms of compound tincture of cardamoms; 1 drachm of simple syrup; and 1 ounce of peppermint water.

Another.—Mix together 10 grains of prepared ammonia; 1 drachm of tincture of capsicum; 1 drachm of syrup of saffron; and 10 drachms of cinnamon water.—Should these medicines not produce any relaxation of the bowels, it will be necessary the following morning to take a dose of some of the neutral purging salts, or, what will answer equally well, the following aperient draught.

Another.—Mix together 15 grains of magnesia, 15 grains of rhubarb powder; 8 grains of carbonate of soda; 1 drachm of simple syrup; and 11 drachms of peppermint water.—To those persons who are *habitually* subject to night-mare, we would advise the frequent repetition of one or other of the draughts, for several nights in succession; after which the aperient draught may be taken if necessary; and costiveness is in all cases to be avoided.

Caution respecting this disease.

Great attention is to be paid to regularity and choice of diet. Intemperance of every kind is hurtful, but nothing is more productive of this disease than drinking bad wine. Of eatables, those which are most prejudicial are, all fat and greasy meats, most vegetables, fruit, and pastry. These ought to be avoided, or eaten with caution, The same may be said of salt meats, for which dyspeptic patients have frequently a remarkable predilection, but which are not on that account the less noxious.

Moderate exercise contributes, in a superior degree, to promote the digestion of food, and prevent flatulence: those, however, who are necessarily confined to a sedentary occupation, should particularly avoid applying to study, or bodily labour immediately after eating. If a strong propensity to sleep should occur after dinner, it will be certainly better to indulge it a little, as the process of digestion frequently goes on much better during sleep than when awake.

Going to bed before the usual hour is a frequent cause of nightmare, as it either occasions the patient to sleep too long or to lie long awake in the night. Passing a whole night or part of a night without rest, likewise gives birth to the disease, as it occasions the patient, on the succeeding night, to sleep too soundly. Indulging in sleep too late in the morning, is an almost certain method to bring on the paroxysm, and the more frequently it returns, the greater strength it acquires; the propensity to sleep is at this time almost irresistible. Those who are habitually subject to the attacks of the night-mare ought never to sleep alone, but to have some person near them, so as to be immediately awoke by their groans or struggles; and the person to whom this office may be entrusted should be instructed to rouse the patient as early as possible, that the paroxysm may not have time to gain strength.

The common hiccup.

The hiccup may in general be removed by taking a pinch of snuff, or any thing that will cause sneezing.

Stomachic draught.

Take of tincture of cascarilla, 2 dr. vitriolic ether, 20 drops, cinnamon water, simple peppermint water, each 1 oz. Make into a draught, to be taken three times a day.

Another.—Take of raspings of quassia, 2 dr. orange peel, 3 do. lemon peel, 4 do. boiling water, 1 pint. Let this remain for four hours in a closed sauce-pan, then strain off. The dose is three table-spoonsful at twelve, seven, and bed time.

Digestive pills.

Take of soft extract of quassia, 1 dr. essential oil of peppermint, 1 drop. Make into 12 pills, of which, take three an hour before dinner. These pills are excellent to create digestion in habits injured by hard drinking.

To improve digestion.

Eat a small crust of bread every morning, fasting, about an hour before breakfast.

To restore the appetite.

Take of shavings of quassia, 2 dr. boiling water, 1 pint. Let this remain in a close vessel until cold, when strain off, and add to the strained liquor, compound tincture of cardamoms, 2 oz. spirit of lavender, 4 dr. powder of rhubarb, 1 scruple. Take three table-spoonsful an hour before dinner, to create an appetite.

Another for the same.—Take of the compound infusion of gentian, 3 dr. prepared kali, 2 grains, spirit of pimento, 2 dr. cinnamon water, 7 do. Make into a draught, to be taken an hour before dinner.

Aloetic and assafœtida pills.

Take of socotrine aloes, in powder, assafœtida, soap, equal parts. Form them into a mass with mucilage of gum arabic. These pills, in doses of about ten grains, twice a day, produce the most salutary effects in cases of dyspepsia, attended with hysteria, flatulence, and costiveness.

For heartburn.

This complaint is an uneasy sensation in the stomach, with anxiety, a heat more or less violent, and sometimes attended with oppression, faintness, an inclination to vomit, or a plentiful discharge of clear lymph, like saliva.

This pain may arise from various causes; such as wind, sharp humours, and worms gnawing the coats of the stomach; also from acrid and pungent food; likewise from rheumatic and gouty humours, or surfeits, and from too free a use of tea.

The diet should be of a light animal kind; the drink brandy and water, toast and water, Bristol water; no vegetables should be allowed; very little bread, and that well toasted.

If heartburn has arisen from ascidity in the stomach, it will be necessary, after a gentle emetic, to take 2 table spoonsful of the following mixture three times a day. 3 dr. of magnesia, 1 scruple of rhubarb, in powder, 1 oz. of cinnamon water, 1-2 a dr. of spirit of lavender, and 4 oz. of distilled water.

Another.—Take of magnesia, 2 scruples rhubarb, in powder, 5 grains, nutmeg, grated fine, 3 grains. This powder is to be taken morning and evening.

For heartburn, attended by pain and flatulence.

Mix together, 12 grains of prepared chalk, 1-2 an oz. of peppermint water, 1 oz. of pure water, 2 dr. of spirit of pimento, and 12 drops of tincture of opium. This draught is to be taken three times a day.

For heartburn, attended by costiveness.

In this case gentle laxatives combined with carminatives, are to be administered, until the cause is entirely removed. Take of confection of senna, 2 oz. jalap, in powder, 2 dr. compound powder of cinnamon, 20 grains, cream of tartar, 1 dr. and syrup of ginger, as much as will form an electuary; of which the bulk of a walnut is to be taken every night on going to bed.

Another.—Take of rhubarb, in powder, and socotrine aloes, each 1 dr. compound powder of cinnamon, 20 grains, hard Spanish soap, 1-2 a dr. and common syrup, in sufficient quantity to make 50 pills; of which let 2 be taken every night, until a healthy action of the stomach is restored.

INFLAMMATORY DISEASES.

To check diarrhœa, or looseness.

Take of the soft extract of bark, 15 grains, purified alum in powder, 5 do. tincture of opium, 6 drops. Make into a bolus, to be taken 3 times a day, in half a glass of red wine.

Another method.—Take of tincture of

opium, 15 drops, chalk mixture, 6 oz. cinnamon water, 1 oz. Make into a mixture, of which, take a large table-spoonful every 6 hours.

Another.—Take of powder of rhubarb, 10 grains, powder of chalk, with opium, 1 scruple, ditto, without 1 dr. Make into 4 papers, of which, take one, night and morning.

Another.—Take of tincture of opium, 20 drops, chalk mixture, 4 1-2 oz. tincture of cinnamon, 1-2 oz. cinnamon water, 2 oz. Make a mixture, of which, take two table-spoonsful after every liquid motion. Given in diarrhœa, and the looseness often attendant upon consumption.

Another.—Take of tincture of opium, 2 dr. vitriolated zinc, 8 grains, rose water 4 oz. Take 2 tea-spoonsful in a wine glass of weak chamomile tea every 4 hours.

Another.—Take of rhubarb in powder, columbo. in do. equal parts, 3 grains. To be given every 3 hours, in this disorder.

Another.—Take of rhubarb, in powder, 3 grains, opiate confection, 6 do. To be taken every four hours in the same disease.

Another.—Take of rhubarb, in powder, 15 grains, compound powder of scammony, 5 do. Mix.

Another.—Take of compound, tincture of rhubarb, 2 dr. tincture of catechu 1 do. tincture of opium, 10 drops. Make into a draught, to be taken three times a day in cases of looseness.

Another.—Take of catechu, in powder, 15 grains, purified alum, 3 do. conserve of roses, 1-2 dr. syrup of white poppies, as much as is sufficient. Make into a bolus, to be taken at bed time,

Another.—Take of catechu, in powder, 1-2 dr. syrup of clove jelly flowers, as much as is sufficient. Make into a bolus, to be taken three times a day. Excellent in diarrhœa.

Another.—Take of catechu, in powder, compound powder of chalk, each 4 dr. syrup of poppies, as much as is sufficient. Make into an electuary, of which take the size of a nutmeg, 3 or 4 times a day.

Treatment of obstinate diarrhœa.

Take of bark, in powder, 2 scruples, compound powder of chalk, with opium, 10 grains. Form a powder, to be taken three or four times a day. This is excellent in obstinate diarrhœa, first evacuating with rhubarb and columbo, equal parts, 3 grains every four hours.

Another.—Put 1-2 an oz. of myrrh, coarsely powdered, into a saucepan, or glazed pipkin, add a pint and a half of spring water, stirring well to prevent the myrrh from becoming lumpy. Add to the mixture, 1-2 an ounce, or three tea-spoonsful of pure starch, and one tea-spoonful of powdered ginger. Stir. Now, boil all together for five or eight minutes, occasionally taking it off the fire to prevent it from boiling over. Let the whole be strained, hot, through a cloth, into a basin, and cover it over, with a plate till cold. Now add, gradually, 1-2 an ounce, of prepared chalk, and two or three table spoonsful of tincture of rhubarb; then put into a quart bottle, to be filled up with peppermint or pure water, if there be not sufficient of the mixture without. Take two table spoonsful, two or three times a day, or oftener, if requisite.

Remedy for flux

Take of catechu, in powder, simarouba bark, cinnamon, each 2 dr. boiling water, 1 pint. Macerate for 4 hours in a covered vessel, strain. Now, take of the strained liquor, 7 oz. compound tincture of cardamoms, 1 oz, opiate confection, 1 drachm. Make into a mixture, of which take two table-spoonsful 4 times a day. Excellent in fluxes of all kinds.

Dysentery and bilious disorders.

The medical qualities of pulverized charcoal are daily developing themselves. In addition to its value in bilious disorders, 2 ounces of the charcoal, boiled in a pint of fresh milk, may be taken in doses of a wine glass full, by adults, every two hours, in the most obstinate dysentery, until relief is imparted, which has not failed to be the effect in almost every instance. It is harmless, and the experiment may be safely tried. Charcoal made from maple wood is the fittest for this purpose.

Anodyne clyster.

Take of tincture of opium, 2 drachms; decoction of barley, 8 oz. Make a clyster to be thrown up directly. To stop diarrhœa, and remove spasm.

Opiate enema.

Take of milk of assafœtida, 8 oz. tincture of opium, 1 drachm. To be injected as a clyster at bed time. This is useful in disorders of the anus, which induce insufferable pain.

To prevent spitting of blood.

Take of the infusion of red roses, 8 oz. syrup of the wild poppy, 1 1-2 dr. diluted vitriolic acid, 20 drops, compound powder of trajacanth, 1 dr. Make a mixture, of which take 2 table spoonsful four times a day. Ordered in spitting of blood, and night perspirations; a medicine of much pleasantness and beauty.

For vomiting of blood.

Take of rhatany root bruised, 1 ounce, boil in a pint and a quarter of water till reduced to a pint. Then strain, and add 2 drachms of diluted sulphuric acid. Three table-spoonsful to be taken two or three times a day.

Treatment of stranguary.

This is a frequent inclination to make water, attended with smarting pain, heat, and difficulty in voiding it, together with a sensation of fulness in the bladder. When this disease arises merely from irritation, plentiful draughts of warm liquid should be given, as barley water, a thin solution of gum arabic, or linseed tea with a small portion of nitre dissolved in it. At the same time, warm fomentations are to be applied to the pubes, or lower part of the belly, and copious emollient and opiate clysters are to be administered. Of the latter the following is the most approved: Mix 1 drachm of tincture of opium, (laudanum,) with 4 ounces, by measure, of boiled starch. Let one of these clysters be injected every five or six hours.

Remedy for piles.

Take of galls, in powder, 2 drachms, hogs' lard, 1-2 an oz. Make into an ointment, to be applied by means of lint to the external piles, or even pressed somewhat up the fundament every night. This has done wonders in the piles, taking, at the same time, the following: Take of quassia, in rasping, 2 drachms, boiling water, 1 pint. Let it remain 3 hours, strain; to 7 oz. of the strained liquor, add aromatic confection, 1 drachm, ginger in powder, 2 scruples. Take of this mixture 2 table spoonsful, at 12 and 7 every day.—See page 237.

For fistula.

A patient of Dr. Browne, procured at a medical herb shop, in Covent Garden, at a shilling an ounce, some of the blossoms of the *prunus silvestris*, the black thorn or sloe tree; an ounce of these was put into a coffee-pot, of the ordinary size, to which he added 3 half pints, or about a Winchester quart of water; it stood near the fire, simmering for some time, then was slightly boiled. The strained liquor, which looks like brandy, was taken two or three times a day, and twice a day he applied to the part affected, a bread and milk poultice, softened with ointment of marshmallows. He speedily recovered.

The pain that generally occurs, previously to a discharge from the sore, may be assuaged by the application of equal parts of the soap liniment, commonly called *opodildoc*, and tincture of opium; or by the use of half an ounce of ointment of spermaceti well mixed with ten grains of powdered opium.—*Monthly Mag.* 1817.

For cholera morbus.

As this disease is really an effort of nature, its course should be arrested with great circumspection; the safest practice is to administer copious draughts of chamomile tea, or even warm water, until the offensive matter is freely evacuated, which may be known by the fluid which is taken, being rejected unmixed; after which the irritation may be allayed by laudanum, from 20 to 30 drops, which should be given in the smallest possible quantity of liquid, and may be repeated every 6 or 8 hours, according to the circumstances. When the irritation is considerably allayed, calomel should be given in doses of from 4 to 8 grains.

Though cholera morbus be highly distressing to the patient, and often alarming to the by-stander, it is rarely difficult to cure, and nature generally effects this for us; it may, however, be useful to add a simple prescription of a Scotch physician, published seventy years ago; and which he affirms to have been followed by wonderful success in cases that resisted all other treatment; after giving warm fluid 3 or 4 times to evacuate the contents of the stomach, he prescribed a decoction of oaten bread carefully toasted as brown coffee, but but not burnt. The decoction should have the appearance of weak coffee; it is said to be exceedingly grateful to the patient, and no case is recollected by the prescriber where it was rejected.

For inflammation in the bowels.

A common bread and milk poultice should be applied to the part affected, as warm as it can well be borne. This will soon relieve the pain and check the inflammation. When the inflammation has come on suddenly, from exposure to cold, the pain may instantly be relieved by a glass of hot brandy and water. Whiskey, or Hollands and water will answer the same purpose. When inflammation of the bowels has arisen from costiveness or any other cause, except sudden cold, a smart purgative should be administered, after the immediate relief from pain has been accomplished.

For rheumatic affections.

Light infusions of ginger alone, taken twice or thrice a day, have been found very efficacious in rheumatic affections. The pains are rendered, at first, more excruciating. Then follow copious perspirations and speedy relief.

For rheumatism.

If not attended by much fever, 1-2 an ounce of the volatile tincture of guaiacum, mixed in a tea-cupful of water gruel, and taken at bed-time, proves often decidedly efficacious.

Another remedy.—In long protracted cases of rheumatism, dried savin, in powder, seems to be the most effectual remedy. Twelve grains are to be taken three times a day, in any convenient liquid, and may be gradually augmented to three times the dose. The savin is a powerful remedy, but is too much neglected. Its sensible effects are, to heat and stimulate the whole system, producing particularly a glow on the surface of the body, with much itching, and now and then a copious rash, of very minute spots called miliary eruptions. It causes also slight perspiration, which seems to be extorted by the mere force of excitement. The pulse, which in the state of rheumatic affection, is often small, weak, and accelerated, now becomes full, active, and comparatively slow. No portion of the body escapes its wide pervading operation; every function being more or less invigorated.

Another.—Take of raspings of guaiac wood, 1-2 lb. liquorice root, 1 oz. sassafras, 1-2 oz. coriander seeds, 3 drachms, lime-water, 3 quarts. Infuse two days, without heat, and strain off the liquor. Take from 4 to 6 oz. twice a day.

Dr. Johnson's recipe for rheumatism.

Take of flowers of sulphur, flour of mustard, each half an ounce; honey or treacle, a sufficient quantity to form an electuary. The size of a nutmeg to be taken several times a day, drinking after it a quarter of a pint of the decoction of lovage root. "The patient to whom this medicine was given," Dr. Johnson says, "was very old, the pain very violent, and the relief it afforded was speedy and lasting."—*Boswell's Life of Johnson.*

Pills for rheumatism.

Take of guaiacum (gum resin,) in powder, soap equal parts, 1 drachm, essential oil of juniper berry, 4 drops.—Make into 28 pills: take 2 four times a day. This is an admirable remedy.

Bolus for the same.

Take of guiacum (gum resin,) scammony, equal parts, 15 grains, syrup of ginger, as much as is sufficient. Make into a bolus, to be taken early in the morning.

Liniment for lumbago and rheumatism.

Take of green oil, or oil of cajeput, 3 oz. Rub in well before the fire. Wrap in flannel double, as hot as can be borne, immediately.

Another for acute rheumatism.

A 1-4 pound of salt-petre pounded fine, and put into a quart of vinegar, simmered in a pan close by the fire until the nitre is dissolved, and then bottled; rub the part affected twice a day with the hand till quite dry.

Ointment for the same.

In America, an ointment of stramonium, made by gently boiling 6 ounces of the recent leaves (bruised) in a pound and a half of fresh hog's lard, till they become crisp, is in high repute as a remedy for this disease. The size of a nutmeg, Dr. Turner of Philadelphia, has found to remove rheumatic pains, after electricity and powerful liniments, with internal remedies, had totally failed; and Dr. Zollickoffer says, that he has known the stramonium ointment to succeed in cases of rheumatism, after the internal exhibition of the tincture of stramonium had no effect. For internal use he prefers a tincture of the leaves (made in the proportion of an ounce and a half of the dried leaves to a pint of proof spirit) to the extract.

Another for rheumatism in the joints.

Take of crystals of tartarized antimony, finely powdered, 30 grains, rectified oil of turpentine, 3 drachms, fresh hog's lard, 1 oz. Mix well together. The skin over the part affected should be well rubbed with this ointment every night till eruptions appear, when the part may be dressed with spermaceti cerate. When the irritation in some degree subsides, the unguent may be again used, and continued at intervals, till the rheumatic pain ceases, and the swelling has subsided, which it generally effects in the course of a week.

Draught for lumbago and sciatica.

Take of rectified oil of turpentine, vitriolic ether, each 25 drops, mucilage of gum arabic, 3 drachms, syrup of poppies, 1 drachm, rose water, 1 1-2 oz. Make into a draught to be taken at bed-time.

Another.—At a recent meeting of the Medical Society of London, oil of turpentine was strongly recommended, as being almost a panacea for acute rheumatism, &c. The formula in which it was administered is as follows:—Oil of turpentine, 20 drops, decoction of bark, 1 1-2 oz. To be taken every 4 hours. The use of the lancet and purgatives were generally premised. No sensible operation ensued from the medicine; but the patients were quickly relieved of the complaint.

Rheumatic pains in the face.

M. Double has administered the sulphate of Peruvian bark in several cases of acute pains in the face, approaching to tic doloreux, with complete success. He advises it to be given in the dose of 6 grains, dissolved in camphorated jalap, three times a day.

For rheumatic gout.

The following medicine, prescribed by Dr. Baillie, has always been found to succeed in removing rheumatic gout, and in allaying the general excitement of the brain and nervous system, which uniformly accompanies it:—Take of camphorated mixture, 7 drachms, infusion of rhubarb, 5 do. tincture of henbane, 1-2 a drachm, subcarbonate of potass, 10 grains. Mix for a draught. To be taken 2 or 3 times a day, particularly the last thing at night.

Wash leather under waistcoats.

In several instances, the best effects have occured from wearing *washing leather* over flannel, as a preservative against the consequence of those exposures to which all are more or less liable. A waistcoat of this material will, in many cases, supersede the necessity of, and prove a more effective barrier against cold, than a great coat, and often even after the establishment of a rheumatism, which refuses to give way before the most powerful medicine, clothing the parts affected with leather, will almost immediately effect an easy cure.

Friction, compression, and percussion.

Not only rheumatism, but the cramp and gout, which bear affinity to each other, have long been greatly relieved by friction, where ever it was bearable, but some cures were performed upon patients slightly attacked, by pertinaciously rubbing the parts day after day: to this method of obtaining relief, Dr. Balfour has recently added those of compression and percussion, with complete success. *Percussion* at the sole of the foot relieves pain there and higher up the limb, and compression affords a certain degree of ease. *Compression*, alone upon the tendon of the heel, (grasping by the warm hand between the finger and thumb,) is sure to afford relief, as long as the pressure is continued, at least so far as the knee. A *bandage* round the thigh gives instant relief to that part of the member; grasping, or repeated pinchings, leave the patient in comparative ease. *Percussion*, by the patient himself, with his crutch, upon the spot *most affected*, is very beneficial. Dr. Balfour "pummels" the same part daily, until the cure is effected.

Tremor, caused by lifting up the limb, is always to be checked by passing a bandage round the ancle; and the reason assigned for this whole series of remedies is the excitement of certain nerves to action, or arresting that of others. This practice is by no means a novelty: it has long been employed by the negroes upon their European masters, by whom it is termed *shampooing*.

Shampooing steam baths.

This mode of bathing which has been introduced into this country by M. Mahomed, a native of Hindostan, has of late been very extensively followed at Brighton, in Sussex.

To the Hindoos, who are the cleanliest and the finest people of the east, we are principally indebted for the bath, used in cases of disease and bodily infirmity; with that people chiefly, this art originated, with them the medicated bath has been brought to such perfection as, in many cases, to supersede the necessity of internal remedies for inflammatory and other diseases.

Many of the complaints to which we are subject, arise from languid circulation, and from an inactive state of the animal functions. These, in most instances, resist the use of medicine and beget consequences the most protracted and fatal. The native practitioners of India are aware of this, and act upon it as a principle, and shampooing has always proved a most salutary and effective remedy.

The plan is simple, merely enveloping the body in steam, arising from water, in which medical herbs of a most agreeable sweetness have been infused, and rubbing the body; this application has in many instances performed wonders, particularly in cases of rheumatism, old sprains, and gouty affections, and in nervous and other complaints. In India, shampooing is practised in a variety of ways.

Persian method.

Sir, R. K. Porter, in his travels through Georgia, Persia, &c. gives the following description of the Persian bathing process:—"The bather having undressed in an outer room, and retaining nothing about him but a piece of loose cloth round his waist, is conducted by the proper attendant into the hall of the bath; a large white sheet is then spread on the floor, on which the bather extends himself. The attendant brings from the cistern, which is warmed from the boiler below, a succession of pails full of water, which he continues to pour over the bather till he is well drenched and heated. The attendant then takes his employer's head upon his knees, and rubs in with all his might, a sort of wet paste of henna plant, into the mustachios and beard. In a few minutes this pomade dyes them a bright red. Again he has recourse to the little pail, and showers upon this quiescent patient another torrent of warm water. Then, putting on a glove made of soft hair; yet possesssing some of the scrubbing-brush qualities, he first takes the limbs, and then the body, rubbing them hard for three-quarters of an hour. A third splashing from the pail prepares the operation of the pumice-stone. This he applies to the soles of the feet. The next process seizes the hair of the face, whence the henna is cleansed away, and replaced by another paste, called rang, composed of the leaves of the indigo plant. To this succeeds the shampooing, which is done by pinching, pulling, and rubbing, with so much force and pressure, as to produce a violent glow over the whole frame. Some of the natives delight in having every joint in their bodies strained till they crack; and this part of the operation is brought to such perfection, that the very vertebræ of the back are made to ring a peal in rapid succession. This climax of skill, however, has a very strange effect to the spectator; for, in consequence of both bather and attendant being alike unclothed, the violent exertions of the one and the natural resistance of the joints in the other, give the twain the appearance of a wrestling match. This over, the shampooed body, reduced again to its prostrate state, is rubbed all over with a preparation of soap confined in a bag, till he is one mass of lather. The soap is then washed off in warm water, when a complete ablution succeeds, by his being led to the cistern and plunged in. He passes five or six minutes, enjoying the perfectly pure element, and then emerging, has a large, dry, warm sheet thrown over him in which he makes his escape back to the dressing room.

Remedy for gout, &c.

The following powder, taken three or four times a week, at bed-time, will effectually destroy the pre-disposition to gout in the constitution. It will also remove heartburn, and other symptoms of indigestion. Take of dried soda, powdered, 1-2 oz. rhubarb, 11 drachms, powder of cinnamon bark, 1 ditto, powder of ginger, 1 do. nutmeg, grated, 1 do. columbo root, 2 do. Mix well together, and divide into 36 doses, one to be taken every night in a glass of water.

Stomachic tincture for gouty persons.

Take of compound tincture of rhubarb, 7 oz. senna, 8 oz. ginger, 1 oz. Mix. One or two table-spoonsful to be taken occasionally. This composition is particularly recommended to gouty subjects whose bowels are not properly relieved every day.

Remedy for the gout.

Take of rhubarb, powdered, guaiac gum, nitrate of potass, flowers of sulphur, each, 1 oz. treacle, 1 pound. Mix well together. From one to two teaspoonsful (according to its aperient effects) to be taken every night, with a little warm gin and water.

The Chelsea pensioner's remedy for gout and rheumatism.

Gum guiacum, 2 drachms, rhubarb, pulv. 1-2 drachm, flowers of sulphur, 1-2 oz. cream of tartar, 2 drachms, 1-2 nutmeg, of ginger powder, 1-2 dr. Make an electuary with treacle, and two teaspoonsful taken night and morning; and if the fit of the gout or rheumatism is severe, a glass of hot rum and water after being in bed; if much fever, white wine and water, or hot gruel. To be continued a few days. If 2 spoonsful relax the bowels too much, then only 1.

Gout cordial.

The following is a valuable remedy for gout and spasms in the stomach. Take of the lesser cardamom seeds, husked and bruised, caraway seeds, bruised, each, 2 oz. the best meadow saffron, 1-2 an oz. Turkey rhubarb, thinly sliced, 1 1-2 oz. gentian root, do. 3-4 of an oz. Mix, and infuse in a wine quart bottle of *white* brandy for a fortnight. The dose is a table-spoonful, with an equal quantity of water, to be taken every third day.

The Portland powder.

His grace the duke of Portland, who was an extreme sufferer from the gout, became acquainted with a medicine in Switzerland, for the cure of that inveterate disorder; and, after the most indubitable evidence, purchased the receipt for the benefit of his country. Of the powder which the duke took himself, he gave directions for the composition and mode of preparation, gratuitously, to all who desired it, as follows:

Take of aristolochia rotunda, or birthwort root, gentian root, tops and leaves, germander, do. ground pine, do. centaury, do. Take of all these, well dried, powdered, and sifted fine, equal weight: mix them well together, and take 1 drachm of this mixed powder every morning fasting, in a cup of wine and water, broth, tea, or any other vehicle you like best; keep fasting an hour and a half after it; continue this for three months without interruption, then diminish the dose to 3-4ths of a drachm for three months longer, then to 1-2 a drachm for six months more, taking it regularly every morning if possible: after the first year, it will be sufficient to take 1-2 a drachm every other day. As this medicine operates insensibly, it will perhaps take two years before you receive any great benefit, so you must not be discouraged, though you do not perceive at first any great amendment; it works slow, but sure; it doth not confine the patient to any particular diet, so one lives soberly, and abstains from those meats and liquors that have always been accounted pernicious in the gout, as champaign, drams, high sauces, &c.

N. B. In rheumatism which is not habitual, a few of the drachm doses may do; but if habitual, or of long duration, the powder must be taken as for the gout. The remedy requires patience, as it operates but slowly in both distempers.

Gout liniment.

The liniment for allaying gouty irritation and inflamation, is made by adding, gradation, 40 drops of sulphuric acid to an ounce and a quarter of olive oil: and after being well shaken, and standing a quarter of an hour, making a further addition of two drachms of the oil of turpentine.

Pradier's cataplasm.

Pradier's remedy for the gout was purchased by the Emperor Napoleon, *pro bono publico*, for £2500:—Take of balm of Mecca, 6 dr. red bark, 1 oz. saffron, 1-2 oz. sarsaparilla, 1 oz. sage, 1 oz. rectified spirit of wine, 3 lbs. Dissolve separately the balm of Mecca in 1-3d of the spirit of wine; macerate the rest of the substances in the remainder for forty-eight hours, filter, and mix the two liquors for use; the tincture obtained is mixed with twice or thrice the quantity of lime water; the bottle must be shaken, in order to mix the precipitate, settled at the bottom by standing.

Mode of application.

The following is the mode af employing the remedy. A poultice must be prepared of linseed meal, which must be of good consistency, and spread very hot, of the thickness of a finger, on a napkin, so as to be able completely to surround the part affected; if it be required for both legs, from the feet to the knees, it will take about 3 quarts of linseed meal. When the poultice is prepared, and as hot as the patient can bear it, about 2 ounces of the prepared liquor must be poured equally over the whole of the surface of each, without its being imbibed; the part affected is then to be wrapped up in it, and bound up with flannel and bandages to preserve the heat. The poultice is generally changed every 24 hours, sometimes at the end of twelve.—*Moniteur.*

PREVENTION AND CURE OF CONTAGIOUS DISORDERS.

To purify the air in halls, theatres, and hospitals.

Dr. Van Marum has discovered a very simple method, proved by repeated experiments, of preserving the air pure in large halls, theatres, hospitals, &c. The apparatus for this purpose is nothing but a common lamp, made according to Argand's construction, suspended from the roof of the hall, and kept burning under a funnel, the tube of which rises above the roof without, and is furnished with a ventilator. For his first experiment he filled his large laboratory with the smoke of oak shavings. In a few minutes after he lighted his lamp, the whole smoke disappeared, and the air was perfectly purified.

Simple mode of ventilation.

Ship's holds are well ventilated when there is wind, by means of a sail, rigged out from the deck to below, like a funnel, whose largest orifice points to leeward. But in some situations, as prisons, where foul air stagnates, this method cannot be adopted. Therefore, the plan has been adopted of making two holes in the side of the building or ship, communicating with the open air by a tin tube. Two pair of bellows are fitted up, the nozzle of one being introduced air-tight into one of the tin tubes, and a leathern pipe nailed on the wall, over the other tube, to which it may be fastened by wax thread. The other end of this pipe is to be made fast to the clicker-hole of the second pair of bellows: a luting of plaister of Paris, rendering both ends air-tight. A common blacksmith's forge bellows will thus empty a space containing thirty hogsheads of foul air, and supply its place with good fresh air in a very few minutes.

Air pipes for ventilating ships, &c.

Air-pipes are used for drawing foul air out of ships, or other close places, by means of fire. One extremity is placed in a hole in the side of a furnace, (closed in every part excepting the outlet for the smoke); the other in the place which it is designed to purify. The rarefaction produced by the fire, causes a current of air to be determined to it, and the only means by which the air can arrive at the fire being through the pipe, a quick circulation in the place where the extremity of the pipe may be situated, is consequently produced.

Ship's lungs.

A machine capable of answering the same purpose as the above, was invented by M. Desaguliers, and is called the *ship's lungs*. It consists of a cylindrical box set up on its edge, and fixed to a wooden pedestal. From the upper edge of the box issues a square trunk, open at the end, and communicating with the cavity of the box. Within this box is placed a cylindrical wheel, turning on an axis. It is divided into 12 parts by means of partitions, placed like the radii of a circle. These partitions do not extend quite to the centre, but are left open for about 18 inches in diameter, in the middle; towards the circumference, they extend as far as possible without interfering with the case, so that the wheel may always turn freely. It is evident, that if the wheel be turned towards that side of the box on which the trunk is, every division will push the air before it, and drive it out through the trunk, at the same time that fresh air will come in at the open space in the centre, to supply that which is thrown out through the trunk. If this machine, then, is placed in a room where a circulation of air is wanted, and the trunk made to pass through one of the walls, by turning the wheel swiftly round, the air will be forced with great velocity out of that room, at the same time that fresh air will enter through any openings by which it can have access to supply that which has been forced out.

The air trunk.

This apparatus was contrived by Dr. Hales, to prevent the stagnation of putrid effluvia in jails and other places, where a great number of people are crowded together. It consists merely of an oblong trunk open at both ends, one of which is inserted into the ceiling of the room, the air of which is to be kept pure: and the other extends a good way beyond the roof. Through this trunk a continued circulation is carried on; and the reason why vapours of this kind ascend more swiftly through a long trunk than a short one, is, that the pressure of fluids is always according to their different depths, without regard to the diameter of their basis, or of the vessel that contains them. When the column of putrid effluvia is long and narrow, the difference between the column of atmosphere pressing on the upper end of the trunk, and that which presses on the lower end, is much greater than if the column of putrid effluvia was short and wide; and consequently the ascent is much swifter. One pan of a single pair of scales, which was two inches in diameter, being held within one of these trunks over the House of Commons, the force of the ascending air made it rise so as to require four grains to restore the equilibrium, and this when there was no person in the house; but when it was full, no less than 12 grains were requisite to restore the equilibrium; which clearly shows that these trunks must be of real and very great efficacy.

German method of cooling and purifying the air in summer.

In the hot days of summer, especially in houses exposed to the meridian sun, a capacious vessel filled with cold water is placed in the middle of a room; and a few green branches (or as many as it will hold,) of lime, birch, or willow-tree, are plunged with the lower ends into the fluid. By this easy expedient, the apartment is, in a short time, rendered much cooler; the evaporation of the water producing this desirable effect in sultry weather, without any detriment to health. Besides, the exhalation of green plants, under the influence of the solar rays, greatly tends to purify the air; but care must be taken that they do not remain in the apartment after night-fall, or in the shade.

To correct the vitiated atmosphere in bed chambers.

Small closets and concealed beds are extremely injurious, especially to young people and invalids. When persons are from necessity obliged to sleep in them, it will be advisable every morning, immediately after rising, to displace all the bed-clothes, and if the sky be serene, to open the door and windows. The various methods which luxury has invented to make houses close and warm, contribute not a little to render them unwholesome. No house can be wholesome unless the air has a free passage through it. For which reason, houses ought daily to be ventilated by opening opposite windows, and admitting a current of fresh air into every room. Beds, instead of being made up as soon as people rise out of them, ought to be turned down, and exposed to the fresh air from the open windows through the day. This will expel any noxious vapour and cannot fail to promote the health of the inhabitants.

Another method.—The purity of air may be also restored by wetting a cloth in water mixed with quick-lime, hanging it in a room until it become dry, and renewing the operation so long as it appears needful.

To fumigate foul rooms.

To one table-spoonful of common salt and a little powdered manganese, in a glass cup, add, four or five different times, a quarter of a wine glass of strong vitriolic acid. Place the cup on the floor and go out, taking care to shut the door. The vapour will come in contact with the malignant miasma, and destroy it.

Cautions in visiting sick rooms.

Never venture into a sick room in a violent perspiration (if circumstances require a continuance there for any time,) for the moment the body becomes cold, it is in a state likely to absorb the infection, and receive the disease. Nor visit a sick person (especially if the complaint be of a contagious nature) with an *empty stomach;* as this disposes the system more readily to receive the infection. In attending a sick person, stand where the air passes from the door or window to the bed of the diseased, not betwixt the diseased person and any fire that is in the room, as the heat of the fire will draw the infectious vapour in that direction, and much danger would arise from breathing in it.

Dr. Haygarth's rules.

Dr. Haygarth, of Bath, has lately published the following rules of safety from contagion; the object is to enable medical and clerical visitors of the sick, to perform their duties with safety:—It may be proper (says Dr. H.) previously to observe, that an infectious fever, in a small, close, and dirty room, is caught by a very great proportion of mankind; not less than 22 out of 23, or a still higher proportion; but, in a large, airy, clean apartment, even putrid fevers are seldom or never infectious. When this poisonous vapour is much diluted with fresh air, it is not noxious.

1. As safety from danger entirely depends on cleanliness and fresh air, the room-door of a patient, ill of an infectious fever, especially in the habitations of the poor, should never be shut; a window in it during the day ought to be frequently opened. In bad cases, a current of air, between a window and door both wide open, may be proper; if the air be very cold or damp, the curtain's of the patient's bed may be drawn close during this ventilation, should peculiar circumstances require such caution. These regulations would be highly useful both to the patient and nurses; but are particularly important previous to the arrival of any visitor.

2. The bed-curtains should never be close drawn round the patient, but only on the side next the light, so as to shade the face: except while there is a current of air between a window and door.

3. Dirty clothes, utensils, &c. should be frequently changed, immediately immersed in cold water, and washed clean.

4. All discharges from the patient should be instantly removed. The floor near the patient's bed should be rubbed clean every day with a wet mop or cloth.

5. The air in a sick room has, at the same time, a more infectious quality in some parts than in others. Visitors and attendants should avoid the current of the patient's breath, the air which ascends from his body, especially if the bed curtains be closed, and the vapour arising from all evacuations. When medical or other duties require a visitor to be placed in these situations of danger, infection may be frequently prevented by a temporary suspension of respiration.

6. Visitors should not go into an infectious chamber with an empty stomach; and in doubtful circumstances, on coming out, they should blow from the nose, and spit from the mouth, any infectious poison which may have been drawn in by the breath, and may adhere to those passages.

Further caution.

Dr. Willich recommends that "as soon as a person has returned from visiting a patient who has had the plague, he ought immediately to wash his mouth and hands with vinegar; to change his clothes, carefully exposing those he has worn to the fresh air; and then to drink a warm infusion of sage or other aromatic herbs. This tends to open the pores, and expel, by means of a gentle perspiration, the pestilential virus, if any should have incorporated with the mass of his fluids. It will also be of considerable service to those who are employed about sick persons, frequently to smell vinegar and camphor, or to fumigate the apartments with tobacco, the pungency of which accelerates the circulation of the blood, and is believed to prevent infection by attracting the contagious effluvia.

Permanent and portable apparatus for purifying the air.

An apparatus for purifying the air, on the principles of Guyton Morveau, has been lately introduced into several of the French hospitals, which possesses the advantage of being portable, and of retaining its properties for a considerable time. It consists of a vessel of thick glass, containing about six decilitres (1 1-4 wine pint nearly.) The edge of the vessel, which is strong, is ground very accurately, and covered with a disk of glass, which seals it hermetically.

This vessel is fixed in a small plank, which supports a frame of wood, in the form of a press, and is provided with a screw to raise or lower the plate of glass, in order to open or shut the apparatus at pleasure.

To produce the disinfecting gas, 40 grammes (1 1-4 ounce) of black oxide of manganese, powdered and passed through a hair sieve, is put into the vessel; afterwards one decilitre (1-6th of the capacity) of pure nitric acid, of 1.40 specific gravity, and an equal volume of muriatic acid, of 1.13 specific gravity, is poured over it.

When the mixture is made, the glass cover is pressed strongly down by means of the screw, care being taken that there is no dirt on the edge of the vessel to prevent it from fitting close. Two-thirds of the vessel must always be kept empty to contain the gas.

To purify any place whatever, it is sufficient to unscrew one turn of the pressure screw, and to leave the apparatus open one or two minutes, according to the size of the place to be purified: the expansion of the gas will be soon perceived through the whole of the apartment: the apparatus is then to be closed.

The effects of this apparatus will continue for about six months, using it daily: and when they cease, the vessel is emptied and washed out, and the ingredients renewed in the proportions indicated.

This is of great utility in purifying the air of hospitals, prisons, workshops, &c. where the number of persons or any other cause, renders such a measure necessary. The only precaution the use of it requires is, to avoid the spontaneous respiration of the gas immediately on its issuing from the vessel, which, without being dangerous, would be disagreeable.

Similar apparatuses on a smaller scale are also made, which are enclosed in a box-wood case, and carried in the pocket.

Fumigating powder.

Take of cascarilla, reduced to a coarse powder, chamomile flowers, aniseed, each, equal parts, 2 ounces. Put some hot cinders in a shovel, sprinkle this gradually on it, and fumigate the chambers of the sick. It takes off all smell, and keeps off infection.

Preparation of acetic acid.

Put 4 ounces of acetate of lead, in powder, into a tubulated glass retort, and pour over it 4 ounces of sulphuric acid. Place the retort in a sand-bath, the heat of which should be kept as uniform as possible. Adapt a common receiver, over which there must be constantly kept a piece of wet flannel or cotton for the condensation of the gas as it comes over. Sometimes sulphurous acid gas will be found to adulterate the acetic acid; this is easily known by the suffocating odours which it emits. The best way to prevent this, is by a slow distillation; or the whole may be distilled a second time. The acetic acid possesses a very pungent odour, owing to its volatility; consequently it should be kept in a well-stopped phial. It is used as the basis of all the aromatic vinegars.

Aromatic vinegar.

Acetic acid may be mixed with camphor and aromatics, as in Henry's aromatic vinegar, in a quantity sufficient for a small smelling bottle, at no great expense. But it is the acetic acid which is useful in preventing infection, and not the aromatics, which are added for the pleasure of the perfume.

Cheap aromatic vinegar for purifying large buildings, manufactories, &c.

Take of common vinegar any quantity, mix a sufficient quantity of powdered chalk or common whiting with it, as long as bubbles of carbonic acid gas arise. Let the white matter subside, and pour off the insipid supernatant liquor; afterwards let the white powder be dried either in the open air or by a fire. When dry, pour upon it, in a glass or stone vessel, sulphuric acid as long as white acid fumes continue to ascend. This product is similar to the acetic acid known in the shops, by the name of aromatic vinegar. The simplicity of this process points it out as a very useful and commodious one for purifying prisons, hospital ships, and houses, where contagion is presumed or suspected, the white acid fumes diffusing themselves quickly around.

Balsamic and anti-putrid vinegar.

Take rue, sage, mint, rosemary, and lavender, fresh gathered, of each a handful, cut them small, and put them into a stone jar, pour upon the herbs a pint of the best white-wine vinegar; cover the jar close, and let it stand 8 days in the sun, or near a fire; then strain it off, and dissolve it in an ounce of camphor. This liquid, strained about the sick chamber, or fumigated, will much revive the patient, and prevent the attendants from receiving infection.

To prevent and destroy the mephitism of plaistered walls.

Wherever a number of people are assembled either in health or sickness, the walls become insensibly impregnated with infectious exhalations. Currents of air, when admitted, sweep and cleanse the atmosphere, but do not carry away the miasmata concealed in the porosity of the walls, which retain the infectious humidity of the perspiration of bodies, gradually condensing on their surface. Quick lime may be substituted to destroy such mephitism of walls, and also to prevent the evil. The most infected tans and sieves lose their smell, when mixed with the whiting or size or lime. Lime enters white-washing, and may become the principal substance of it, by substituting it for Spanish white. When made the principal ingredient of white-washing, it will prevent walls from being impregnated with infectious miasmata. The addition of milk and oil are requisite, for lime has no adhesion on walls, nor can a body or substance be given to the layer. The slightest rubbing with a pencil brush will rub it off and leave the wall naked. The cheesy part of the milk with the addition of oil, which makes a soapy body with lime, forms, after the evaporation of the humidity, a dense coherent layer, or sort of varnished plaister, which overcomes the porosity of stone, plaister, brick, and wood. This wash has another advantage, that of checking the *nitrification* of walls, which the painting of them in water colours has a tendency to accelerate.

Common typhus fever.

Typhus principally attacks those of weak lax fibres; those who lead a sedentary life, and neglect proper exercise; those who study much; and those who indulge freely in enervating liquors. Also those who are weakened from not using a quantity of nutritive food, proportionable to the fatigue they daily undergo; hence it is very prevalent among the poor. It is often generated in jails, hospitals, transport and prison ships, ill-constructed and crowded barracks, workhouses, and the ill-ventilated apartments of the indigent. It is also to be met with very frequently in the damp and dirty cellars of the poorer class of manufacturers in large towns.

Mild diaphoretic draught for common typhus fever.

Although medicines which might excite much sweating would be highly improper in this fever, it is proper to give those which are mildly diaphoretic. Take of lemon juice, 1-2 oz. sub-carbonate of potass, 1 scruple, cinnamon water, 1 oz. aromatic confection, 10 grains, syrup of ginger, 2 drachms. Mix; and let the draught be taken every 4 hours.

Another.—Take of camporated mixture, 10 drachms; solution of acetate of ammonia, 3 do. spirit of nitric ether, 30 drops. This draught may be taken every 4 hours.

To assist these remedies a cool drink should be allowed, and the bed clothes be light. A plentiful supply of fresh cool air will be a powerful auxiliary to the other means employed.

Purgative in common typhus fever.

If there is any nausea or vomiting at the commencement of the disease, it will be right to give immediately a gentle emetic of about 14 or 16 grains of ipecacuanha; or should any costiveness prevail, the following medicine may be given to carry off the feculent matter:—Take of calomel, 3 grains, powdered jalap, 10 do. syrup of buckthorn, sufficient to form a mass, which divide into three pills for one dose.

To insure and keep up a regular alvine evacuation in the further course of the disease, it will be proper to repeat the above from time to time, or to have recourse to emollient laxative clysters. If much purging should arise in this disease, recourse is to be had to those medicines (under the head of inflammatory diseases) which are most proper to check it.

Opiate mixture for typhus fever.

Mix together 3 drachms of liquid acetate of ammonia, 2 drachms of syrup of ginger, 1 oz. of cinnamon water, and 30 drops of laudanum.

This draught is to be given early in the evening, when the most beneficial effects will result to the patient who can procure sleep by no other means.

Another.—Shake together in a phial, 1 oz. of complioratcd mixture, 3 drachms of syrup of poppies, and 24 drops of antimonial wine. This draught to be given in the evening as above.

Tonic mixture on recovery from typhus fever.

Mix together, 4 oz. compound infusion of gentian, 1-2 oz. tincture of columbo, 1-2 oz. compound tincture of cardamoms.

Two table-spoonsful are to be given morning, noon, and evening, with the occasional addition of 30 drops of elixir of vitriol.

Malignant or putrid typhus fever.

The following instructions were drawn up under the direction of the medical gentlemen of the fever hospital in Dublin, in order to prevent infection from the typhus fever, which for several summers has raged among the poor in Ireland.

For one or two days the person affected cannot bear exertion, loaths food, sometimes vomits whatever is taken into the stomach; a general sense of uneasiness, rather than pain, is felt, a wish to lie down, yet a restlessness when in bed, or sometimes sleepiness. To these succeed shivering with a sense of coldness, while to a by-stander, the skin feels hot; thirst, pain of the head and back, and very generally a feeling of weight and pain about the stomach, with vomiting of bilious matter.

Treatment.

Sometime within the first three days, give an emetic of hippo, mixed in a tea-cupful of warm water, and work it off with thin oatmeal gruel. If the belly be costive, give a common house clyster, and repeat it every day, if necessary. Let the drink be milk whey, or thin gruel, to each quart of which add a tea-spoonful of cream of tartar, if there be no looseness of the bowels; but if there be omit the cream of tartar. No other medicine or food should be given till signs of weakness, or a cool skin, with appetite, come on. In the former case, give a little wine or weak punch; in the latter, frumenty and milk, which should be very cautiously and gradually changed to more nourishing diet during recovery, as relapses are often the consequence of over-eating at this period. If fixed pains be felt in the breast, or any other part, a blister should be applied over it. The face and hands should be washed, and kept clean with warm water and soap, and the bed clothes kept clean; the apartment should, at every stage of the fever, be kept cool, and with as few persons, besides the attendants, as possible. Should a great disposition to sweat appear within the first five or six days, the room should be kept cool, but still not warm. During the whole sickness, the floor and clothes should be frequently sprinkled with vinegar. Bleeding should hardly ever be employed.

Useful purgative for the same.

After the stomach has been well cleared by an emetic of antimonial wine, the bowels ought to be opened by the following aperient mixture, viz. senna tea, 1 1-2 oz. cream of tartar, 3 drachms, manna, 2 do.

Another.—Incorporate together 5 gr. of calomel, and 10 gr. of compound extract of colycinth. Divide the mass into 3 pills, which are to be taken as one dose.

This purgative is to be followed, 12 hours after, by a tea-cupful of infusion of senna.

When rest cannot be procured, or when the patient is delirious, it will be proper to give the opiate mixture mentioned under the head of Common Typhus, with this difference, that in malignant typhus, 40 drops of laudanum will be required instead of 30, or 4 drachms of syrup of poppies instead of 3.

To guard against the infection.

Immediately after the recovery, removal, or death of the patient, let all the doors and windows be thrown open, and remain so for several hours. Let the house or room be immediately cleansed; all dirty clothes, utensils, &c. should be immersed in cold water. The bedclothes, and all clothes, used by the sick person, and every one about him, should also be steeped in cold water, then wrung out and washed in warm water, with soap, and every box, chest, drawer, &c. in the house, or room, should be emptied and cleaned. If the patient has lain on straw beds, let the straw be immediately burned, and fresh straw provided, and the ticken steeped in cold water and dried well before it is used again: and let all the beds, of whatever kind, be exposed to the open air as much as possible for a week. White-wash all the rooms, and the entrance to them, with lime newly slaked, and while it continues bubbling and hot. The peasantry should scrape their floors with a shovel, and wash clean both them and their furniture. They should keep in the open air as much as possible for a week, wash the face and hands, and feet, and comb the hair every morning at least.

Further preservative.

The human body may be secured against the influence of the atmosphere in producing typhus fever, or the effluvia from the diseased, by smelling occasionally, and carrying about them, a handkerchief sprinkled with a solution of camphor, in the pure pyro-ligneous acid. By impregnating the air of the room of the sick with this acid, (by sprinkling over the bed and floor) the immediate attendants and inhabitants of the house will also be secured against the fever; and the inhalation of the air thus medicated, has proved more beneficial in restoring the patient to health, than medicine taken into the stomach.

The following is the method of making the solution. Rub a drachm of camphor with 1-2 an ounce of alcohol, in a glass mortar, and then add 5 ounces of the pure pyro-ligneous acid.

Yellow, or West-India fever.

This fever is called by the Spaniards *vomito presto;* and by the French *maladie de Siam,* and *la fievre de matelot.* It chiefly attacks the Europeans, and more especially those who have too much indulged themselves in the free use of wine and spirits and violent exercises, and exposed themselves to the heat of the sun, or the evening damps.

Bleeding freely is generally necessary, and that must be proportioned to the strength of the patient: though it is very rarely found to be of any use after the third day. During the operation, the physician should apply his finger to the patient's pulse, and if he finds it flag, he should immediately desist; but if, on the contrary, it should become more free and full, he may be more liberal in the evacuation. But it is always better to repeat it than draw too much at once. After bleeding give a gentle emetic, and the same evening throw up a clyster, if the belly be costive; and make a thorough evacuation in the intestinal canal, by giving small and repeated doses of saline purges. When the bowels have been well cleansed, immediate recourse should be had to Peruvian bark, in large and repeated doses. If the stomach will not bear the bark in powder, a slight decoction or cold infusion of it may be tried. The time of giving this febrifuge is upon the very first remission, or when a plentiful perspiration ensues.

Another remedy.—Where the bark cannot be obtained or complied with, give repeated doses of subcarbonate of soda in fresh lime juice, or the like, and let them always be swallowed during the act of effervescence.

Another.—If putrid bile predominates, give as follows:—manna, 2 dr. tamarinds, 1 oz. sulphate of potass, 30 gr. Dissolve the whole in 6 oz. of boiling milk, and add of tincture of senna 1 1-2 oz.

Let the patient take three table-spoonsful of this mixture, and one every hour, until the bowels are well acted on.

This simple procedure often answers very well in this disease: in the beginning give freely of the tamarind beverage: and as the fever decreases, a little wine may be allowed. Towards the close, give 2 or 3 drops of elixir of vitriol, in a wine-glassful of decoction of bark, or in mint, or snake-root tea.

To prevent vomiting in yellow fever.

The vomiting attending this disease often eludes all the art of the physician. Sometimes a decoction of toasted bread drunk in small quantities, with two or three drops of tincture of opium in each draught, has been found very useful. Cataplasms of bread soaked in red wine, with a few drops of tincture of opium, may be applied to the pit of the stomach.

The saline draughts may also be tried in the act of effervescence. If these should fail, a blister may be applied to the region of the stomach.

If a delirium come on, the head and temples should be shaved, and bathed with warm vinegar; the hands and feet should likewise be fomented with the same liquor; and warm water impregnated with vinegar, should at the same time be made use of to bathe the feet.

Prevention of yellow fever.

As soon as Europeans get into the warmer latitudes, if they be plethoric, they should lose some blood, and take once or twice a week, for a fortnight, a little cooling physic, such as salts and manna, or a litle sea-water. Their diet should be sparing, and they should refrain from salt meat as much as possible. Their drink should be rum and water, made *weak*, which may be acidulated either with the vegetable or mineral acids; and wine may be allowed in moderation. They should keep as much upon deck, to enjoy the pure air, as the weather will admit of.

When they arrive on shore, they must be very careful of not indulging too much either in eating or drinking; and particularly in not exposing themselves to the heat of the sun, or the night air; as an error in these things is often of the most fatal consequence. Their food should be such as is easy of digestion, and should consist chiefly of vegetables and sub-acid fruits. For drink, rum and water, or wine and water. And, above all, let the body be kept gently open, once in six or seven days, for eight or ten weeks, till the constitution be somewhat inured to the heat of those burning climes.

Scarlet fever.

This fever takes its name from the scarlet efflorescence which appears on the skin of the whole body, not rising above the surface, attended with heat, dryness and itching. After 2 or 3 or 4 days, the efflorescence disappears, the skin peels off, and there remain branny scales dispersed over the body.

Treatment.

Where the disease appears in this simple state, there is little required from art but the warmth of the bed, confining the patient to diluent drinks, and giving a gentle cathartic or two at the close of the distemper.

Malignant scarlet fever.

The scarlet fever sometimes puts on a very malignant appearance. It then attacks with chilliness, languor, sickness, and oppression; these are succeeded by great heat, nausea, and vomiting, with a soreness in the throat, a small quick pulse, and a frequent and laborious breathing. The tonsils appear inflamed and ulcerated, though not much swelled; and on the third day the efflorescence appears, but without any relief.

Treatment.

This dangerous kind of the scarlet fever requires great caution and judgment in the method of cure. Bleeding can hardly be ordered with safety; but if inflammatory symptoms should prevail so as to require that evacuation, it must be made by applying cupping-glasses betwixt the shoulders, and repeating the operation as occasion requires. The same precaution is also necessary in promoting an evacuation of the bowels; for antimonials, which are so successful in other fevers, in this frequently bring on violent purging. The body, if costive, must be kept open by gentle and emollient clysters. A blister should be applied between the shoulders, and another round the throat, if there is great difficulty in breathing. If a putrescent state of the body takes place, the chief dependence must be on Peruvian bark, joined with snake-root and cordials. If the bark should run off by stool, three, four, or five drops of laudanum may be added to each dose. Fumigations, as before directed, are necessary to prevent infection from this disease.

Miliary fever.

The miliary fever takes its name from the pustules or bladders resembling, in shape and size, the seeds of millet. There are two kinds of this eruption, the white and the red. It begins with a shivering, followed by a proportionable degree of heat; a depression of spirits; a pulse sometimes quick and weak, at other times rather depressed and hard; an oppression at the forr-part of the chest; a frequent sighing; terror after sleep, and pale urine. On the third or fourth day the eruption appears chiefly on the neck, breast, and back, being generally preceded by a profuse sweat of a sourish smell, and a pricking or tingling sensation in the skin, especially in the fingers, and an itching in those places where the pustules are most numerous. After the eruption is completely out, the symptoms subside, the urine becomes higher coloured, and the pulse more calm, soft, and full. In about seven days the eruptions dry and peel off.

Treatment.

If the febrile symptoms run high, bleeding in the beginning, before the eruption, will sometimes be necessary, which must be proportioned to the different circumstances of the patient's case; and then the following draught to be given: Take of lemon juice, half an oz. carbonate of ammonia, 10 grains, antimonial wine, 35 drops, pure water, 1 oz. and balsamic syrup, 2 dr. Mix. This draught is to be taken every 4 hours, as long as is necessary.

Further remedies.—If, on the contrary, the fever should appear of the low nervous kind, cordial medicines are required, and wine-whey may be allowed for drink, but the patient must not be kept too warm.

When a violent pain in the head, or delirium occur, a blister should be immediately applied betwixt the shoulders.

Treatment of small pox.

When a person who has never had the small pox is attacked with febrile symptoms after having been exposed to infection, a strict pursuance of the antiphlogistic plan is advisable; debarring the patient from animal food, impregnating his drink with cooling acids, keeping his body open with gentle laxatives; and above all, exposing him freely to cool air; the more urgent thd symptoms, the more will the patient stand in need of air; for where the ventilation is free, it is inconceivable how refreshing it proves; and how suddenly it is capable of reducing the pulse, and of moderating all the symptoms. The proper treatment of the patient from the very first attack of the disease, will have great influence on the form which it assumes: if he be kept in a warm room, be loaded with bed-clothes, and get warm drink, the fever will be severe and the eruption copious; while by an opposite treatment the disease may be broken at the beginning.

In the early stage of small-pox, and during the eruptive power, when the symptoms run high, it will be proper to wash the body generally with cold water. This, when had recourse to on the attack of variolous fever, usually mitigates the head-ache, pain in the back, and other febrile symptoms; a slow and gentle perspiration succeeds, and a mild eruption takes place. Where it is resorted to after the small-pox has made its appearance, and by their quantity and the duration of the fever a confluent pock is expected, the cold bath not only moderates the febrile symptoms, but also diminishes the number of the pustules, and greatly lessens the danger of the disease.

Temperature.

The temperature of the patient's chamber should always be such that he may experience no disagreeable degree of heat, but rather a sensation of cold; and except he complains of being chilly, the cool regimen cannot be carried too far.

He should lie on a matrass covered only with a few bed-clothes, a feather bed being apt to occasion too great an accumulation of heat. He should have an apartment to himself, as the heat of a crowded room must prove injurious; and his body-linen, as well as that of the bed, should be shifted frequently.

In adults of a plethoric and robust habit, the fever and general inflammation sometimes run so high, as to be accompanied with great heat and dryness of the skin, redness of the face and eyes, considerable difficulty of breathing, acute pain in the head, stupor, or delirium; in which cases local blood-letting by scarification of the temples, or the application of leeches, is necessary. Where the eyes look red and fiery, or stupor prevails, topical bleeding may prove a valuable remedy.

Great caution should be observed with respect to the use of purgatives. To dislodge the contents of the intestines in such cases, where costiveness prevails, the most gentle laxatives, such as the neutral salts, with the occasional use of emollient clysters, only should be employed.

On the coming on of the fever, the stomach in some cases is much disordered, and a constant nausea, or frequently vomiting, is apt to arise: to obviate these, it will be proper to give a gentle emetic, working it off with a few draughts of chamomile tea.

To prevent convulsions.

Convulsive fits sometimes attack children previous to the appearance of the eruption. These are apt to alarm those who are not conversant with the disease. In this instance, little more will be requisite, in general, than to admit cool air freely to the child; but should the fits occur at a very early period of the disorder, and be repeated frequently with any violence, they then are attended with considerable danger, and ought to be removed, if possible, by giving opium in doses proportioned to the age of the child. About 5 drops of laudanum, will be sufficient for a child of a year old, 8 drops for one of two years old, and so on.

To excite the appearance of pustules.

In these cases where the eruption does not come out kindly, the whole body should be immersed in a warm bath; putting the feet and legs into warm water at first, and using at the same time a more generous diet.

To counteract the febrile symptoms.

If there be great irritability and restlessness, opium, in small quantities, either with a saline mixture, or a grain or two of antimonial powder, will be serviceable; also where the febrile symptoms run high after the appearance of the eruption, small and repeated doses of antimonial wine should be given.

To lessen febrile heat and excitement, nitre and saline draughts may be employed, administering the latter in the act of effervescence. Cold diluents, such as lemonade, or the liqueur called *imperial*, &c. may be taken freely to allay thirst.

Use of tonic medicines.

In those cases where the pustules contain a thin watery fluid, and are accompanied with great soreness, uneasiness, loss of strength, and lowness of the pulse, Peruvian bark should be given in large doses, and be frequently repeated; and although it may, perhaps, increase the difficulty of breathing, and render the expectoration a little more difficult, still its good effects in obviating the symptoms of irritation, and the tendency to putrescency, will greatly overbalance the former. To assist the effects of this bark, a free use of wine-whey ought to be allowed.

Confluent small pox.

In the confluent small-pox, particularly where there is a putrid tendency, where the pustules are filled with a bloody water, or where petechiæ are interspersed among them, recourse must also be had to the Peruvian bark joined with wine, together with acids, more particularly the muriatic and sulphuric.

If the eruptions, after having made their appearance, strike in suddenly, or if the disease has arisen in a person of lax fibres, and is attended with a weak low pulse, and a sinking in of the pustules, then, besides allowing a liberal use of wine-whey, cataplasms should be applied to the soles of the feet, and blisters successively to different parts of the body, paying no regard to their being covered with pustules; camphor, ammonia, musk, and aromatics, will also be advisable medicines. The warm bath will also be proper.

Administration of opiates.

Where suppuration in the pustules does not go on kindly, owing to want of rest, opiates will be necessary. About 40 drops of laudanum may be administered to an adult every night at bed-time, and one or two tea-spoonsful of syrup of poppies to young children. If opiates are given when the excitement is considerable, or if they are found to induce stupor, their use will be improper; but in all other cases, more particularly during the ripening stage, in the confluent small pox, a quantity of opium, sufficient to allay restlessness, provided care be taken, (by administering gentle laxatives,) to prevent its constipating effects, will be sure to prove beneficial.

Treatment of sore throat, &c.

When a degree of sore throat is present, gargles, and the inhalation of warm steam may be used.

The secretion from the glands of the mouth and throat, in the confluent small pox, usually goes on without the help of medicines until near the completion of the suppuration, so that it is only necessary to defend the parts from the matter secreted by giving mucilaginous drinks, such as barley-water, linseed-tea, or a solution of gum arabic: but towards this time, the secretion is apt to become so thick and viscid, as to be expectorated with the greatest difficulty: and often even to endanger suffocation. In this case an emetic should be given, after which the mouth and throat must be washed out frequently with the following gargle: Take of infusion of roses, 7 ounces, honey, 1-2 ounce. Mix.

If the emetic does not afford a permanent relief, then apply a blister to the throat. When the swelling of the face begins to subside, if the extremities do not become puffy and swelled, as they ought to do, cataplasms and blisters may be applied to them, to excite inflammation. Determination to the head or chest, or other viscera, requires blisters, the foot-bath, and mustard cataplasms to the feet.

Vomiting.

Obstinate vomiting, which is a dangerous symptom, is most effectually allayed by the following saline medicine, taken in the act of effervescence; mix together, syrup of orange-peel, 1 dr. carbonate of potass, 1 scruple, laudanum, 12 drops, and cinnamon water, 10 dr. Let this draught be taken every four hours, with a table-spoonful of lemon-juice.

Diarrhœa.

Profuse diarrhœa is a troublesome occurrence in confluent small-pox, particularly in children: but unless this symptom produces a dangerous degree of debility, it should be checked cautiously; and even when it does occasion considerable debility, the safest plan will be to endeavour to moderate it by very gentle astringents and tonics.

In all cases where there is a propensity to sweating, after the eruptive fever has passed, a cool regimen will be particularly necessary.

Secondary fever.

In the distinct small-pox there ensues little or no secondary fever; but it regularly attends on the confluent, and is always in proportion to the number of pustules. This being the case, every one should be opened as soon as the suppuration is completed; and in order to moderate the fever, as well as to prevent hectic symptoms, and after-suppurations from arising, mild cathartics ought to be employed, so as to keep the bowels regularly open.

If, at the approach of the secondary fever, the pulse be quick, hard, and strong, the heat very great, the head much affected, and the breathing laborious, leeches ought to be applied. If on the contrary, the patient is faint, the pustules look pale and much indented, and the extremities feel cold, with other symptoms of irritation, the fever is of the typhoid kind; and the proper remedies to be employed are Peruvian bark, conjoined with wine and aromatics, together with mineral acids, opium, and artificially prepared pure air, or oxygen gas.

To prevent pitting.

To prevent the face from being marked after the confluent small-pox, bathe it three or four times a day with warm milk and water, and on the seventh or eighth day apply over its whole surface a mask made of fine cambric, thinly spread wish a soft liniment, composed of olive oil, white wax, and prepared lard, so as to exclude the external air; which application is to be renewed two or three times a day.

To prevent injury to the eyes.

When the pustules are numerous on the face, it sometimes happens that the eyes become much affected, and that a loss of sight is the consequence. In those cases, therefore, where the face is much beset with pustules, the use of mild and gently astringent collyria, or eye-waters, should never be neglected. To prevent the eye-lids from adhering together in such cases, bathe them from time to time with warm milk, and besmear them frequently with a little emollient ointment of any kind.

Diet.

In the confluent small pox, as well in the distinct, the patient's strength must be supported by food of a light nutritive nature, such as panado, bread-pudding, preparations of sago, arrow-root, roasted apples, &c. and for common drink he may take thin gruel or barley-water gently acidulated, together with a little wine-whey now and then, when the febrile symptoms do not run high. If the accompanying fever is of typhoid nature, a liberal use of wine will be proper.

Vaccination, or prevention of small-pox.

Could all parents be persuaded to inoculate their children with vaccine matter soon after birth, the small-pox might soon be entirely eradicated. Indeed, vaccination has penetrated to the remotest corners of the globe; and wherever it has been introduced, the increasing experience of every year has served to confirm a confidence in its efficacy.

In vaccinating children and other persons, the following circumstances are carefully to be attended to:

1st. The matter should not be taken from the pustule later than the ninth day of the disease.

2nd. The matter should be perfectly transparent, as it is not to be depended upon, if it has become in the least degree opaque.

3d. The matter, if not used immediately, should be allowed to dry gradually and thoroughly before it is laid aside for future use.

4th The punctures are to be made in each arm, the point of the lancet being previously dipped in the vaccine matter.

5th. The punctures cannot be made too superficial, and on no account should more than one be made in each arm.

6th. After vaccination, it will be necessary to repress, as soon as possible, any excess of inflammation that may happen to arise. This will be best done by cold applications.

7th. With respect to the operation of the vaccine matter, it will be important to ascertain that the vesicle has not acted locally, but has effected the desired change in the constitution. This will be known by re-vaccinating during every period of the progress of the disease that has been communicated.

8th. The characteristics of the cow-pox naturally, and by vaccination are, a circumscribed, circular, and elevated vesicle or eruption; surrounded by a red halo or efflorescence, with a smooth surface. The scab which occurs after suppuration, adheres long, and is of a brown black or mahogany colour.

9th. Medicine seems wholly unnecessary in the cow-pox, except in those cases of the natural disease where much febrile heat attends; and then cooling medicine and regimen are to be adopted. In the communicated disease, it will be generally necessary to administer a gently aperient medicine to the patient.

There is little doubt but that whatever failures may have occurred, are to be imputed to the inexperience of the early vaccinators; and it is by no means unreasonable to expect that further observation will yet suggest many improvements that will reduce the number of anomalous cases, and furnish the means of determining, with greater precision, when the vaccine disease has been effectually received into the constitution. At all events it has been well ascertained that persons who have been vaccinated, and who have afterwards taken the small-pox, have generally had imperfect pustules in the latter disease. These pustules have died away in a few days without exciting any constitutional complaint; the inference to be drawn from which is, that even for the sake of moderating the influence of the small-pox, vaccination should previously be adopted. Experience has also shown that there is no reason to apprehend the least deformity of the skin, from the vaccine inoculation.

Chicken-pox.

The eruption is often preceded by chilliness, succeeded by flushings and heat, pains in the head and back, thirst, restlessness, and a quick pulse. About the second or third day, the pustules become filled with a watery fluid, (which is never converted into yellow matter, as in small-pox) and about the fifth day they usually dry away and are formed into crusts or scabs. No danger ever attends this disease.

Treatment.

In general, it is only necessary to make use of a spare regimen on the first appearance of the eruption, and to give one or two cooling purgatives afterwards: but should the febrile symptoms run high, it may then be advisable to make the patient take frequent small antimonial doses, with saline draughts and nitre, as for simple fever; drinking plentifully at the same time cold diluting liquors, and keeping the body open with gentle laxatives or emollient clysters. The like treatment will also be proper in the swine-pox, which is, indeed, only a species of the chicken-pox.

The measles.

The measles are known by the appearance of small eruptions, resembling flea-bites, over the face and body; but particularly about the neck and breast, not tending to suppuration.

The signs are chilliness and shivering, pain in the head, fever, sickness, and vomiting, as happen in most fevers; but the chief characteristic symptoms are, a cough, and heaviness about the eyes, with swelling and inflammation, together with a discharge of a serious humour from the nostrils. The eruptions appear about the fourth or fifth day, and sometimes about the end of the third. On the third or fourth day, *from their first appearance*, the redness diminishes, the spots or very small pustules dry up, the skin peels off, and is replaced by a new one. The symptoms do not go off on the eruption, as in the small-pox, except the vomiting; the cough and fever increase, with the weakness and defluxion on the eyes.

To distinguish scarlet fever from the measles.

The scarlet-fever sometimes resembles the measles so exactly as not to be easily distinguishable; though this is a matter of great importance, because the manner of cure in the two diseases is extremely different. The redness of the scarlet-fever is more equally diffused than in the measles, and is not, like the latter, in distinct spots with the natural colour of the skin interposed. In the measles also, the eruption rises more above the skin, and occasions a roughness to the touch, which is hardly observable in the scarlet-fever, except a very little roughness sometimes in the arms. In the scarlet-fever there is seldom a severe cough; the eyes do not water much, and the eye-lids are not red and swoln; all which rarely fail to attend the measles. The time of the eruption is likewise different, for it appears in the scarlet-fever both in the face and arms on the second day; but in the measles it begins only about the third day to be visible on the chin and breast, and does not come to the arms and hands till the fourth or fifth day.

Treatment.

In some instances the measles make their attack in a mild manner, and go through their natural course without medical aid; but in others the febrile symptoms run high, particularly after the appearances of the eruption, and are accompanied with a strong pulse, much coughing, great difficulty of breathing, and other symptoms of inflammation of the lungs. In such cases, the abstraction of blood from the chest, by means of leeches, or cupping-glasses, may be repeated from time to time. In those instances where the pulse is weak, and from the nature of the epidemic, there are strong reasons to apprehend an accompanying fever of the putrid kind, bleeding ought not to be adopted.

During the whole course of the disease it will be highly proper to keep the body open; and, therefore, if costiveness prevails, it should be obviated by giving cooling laxatives, such as the neutral salts, and emollient clysters. Should the difficulty of breathing and oppression at the chest be not relieved by the bleeding, and other antiphlogistic means, a blister may then be applied in the neighbourhood of the part or between the shoulders. In removing local inflammation, the application of a blister often proves a valuble remedy.

Where inflammation attacks the chest, a warm bath, strongly impregnated with salt, has been found a powerful subsidiary remedy in addition to blood-letting.

The cough being usually very troublesome, it will be necessary to make frequent use of some demulcent pectoral, either of an oily or mucilaginous nature, which will sheath the throat, and obviate that rawness and soreness of it, which are generally much felt. Besides using pectoral medicines, the patient may drink freely of barley-water, linseed-tea, or the compound decoction of barley, gently acidulated with lemon-juice. If the patient be oppressed with a tenacious phlegm threatening suffocation, the best way of dislodging it is to give an emetic.

Emetics, however, are to be used with great caution here, as the blood is much agitated, and the pulmonary vessels much weakened by coughing.

The foot-bath is sometimes of use to relieve the head and chest, and steams of hot water received into the lungs are often of service in relieving the cough and soreness of the throat.

If the fever is high and great thirst and restlessness prevail, small nauseating doses of antimonial wine may be given every two or three hours, also nitre and saline draughts, as in cases of simple fever. From the first attack a clyster should be given every day, especially if the body be costive.

Administration of opiates.

When the cough harasses the patient much by night, so as to deprive him of rest, it will be necessary to give him an opiate about bedtime. The following draught may be used for adults, combined with some diaphoretic.

Take of solution of acetate of ammonia, 1·2 oz. syrup of tolu, 2 drachms, tincture of opium 40 drops, spirit of nitric æther, 40 drops, solution of tartarized antimony, 20 do. pure water, 1 oz. Mix them for a draught.

For children, it will be better to substitute the syrup of poppies, instead of any preparation of opium.

Opiates are, however, to be administered with great caution in this disease, as well as in all other inflammatory ones, and ought never to be employed where there is much fever present, with great difficulty of breathing. When these symptoms have been removed by timely bleeding, aperient medicines should be given, but when the cough and watchfulness only are urgent, opiates will prove both safe and efficacious.

To excite the eruption after striking in.

When the eruption of measles disappears before the proper period, and great anxiety, and delirium, or convulsions, take place, the indication will be to restore the eruption to the skin. To effect this, immediate recourse must be had to the warm bath, blisters to the chest and legs, and the administration of wine properly diluted with warm water. The following mixture is likewise to be given: Take of camphor mixture, 5 oz. compound spirit of sulphuric æther, 2 dr. solution of acetate of ammonia, 1 oz. solution of tartarized antimony, 30 drops; shake them. Of this mixture take two table-spoonsful every 2d or 3d hour.

General regimen.

Throughout the whole course of the measles the patient ought to be confined to the bed, and avoid any exposure to cold air which might repel the eruption; but in observing this precaution, he is not to run into the opposite extreme, and excite increased heat either by loading himself with bed-clothes, or by not allowing a sufficient ventillation through his chamber. The degree of temperature should be regulated by the patient's feelings. The measles do not either require or bear the free application of cold, which is so potent a remedy for the most distressing symptoms of scarlet-fever; but nevertheless the propriety of coolness in the apartment and bed, as also in the drink of the patient, must be obvious.

A diluent and antiphlogistic diet being one of the best means of obviating inflammatory complaints, it is to be recommended in the early stages of the measles: but in managing it properly, we should recollect its tendency to produce debility, and in weak habits be careful not to push it too far. Where the disease shows a malignant and putrid tendency, a diet of this nature would be highly improper. In such cases, a quantity of wine, proportioned to the age of the patient, the urgency of the symptoms and the effect it produces, ought to be allowed, in addition to the Peruvian bark, mineral acids, and opiates.

After treatment.

After the disappearance of the eruption, it will be proper to give one or two cooling doses of some cooling purgative. This practice is worthy of attention, as ophthalmia and other troublesome complaints may probably be prevented by conformity to it.

If a difficulty of breathing, pain in the side, and cough, should ensue in consequence of the measles, it will be adviseable to take away a proper quantity of blood; besides which, the patient must be treated as for pulmonary consumption, making use of a milk and vegetable diet, breathing as pure an air as possible, and taking daily horse exercise: but he should carefully avoid cold.

As weeping from the eyes and slight ophthalmia are apt to ensue after the measles, wash them occasionally with a little rose-water, in which a few grains of white vitriol have been dissolved, and avoid exposure to any glaring light.

Preventive treatment.

When the measles prevail epidemically, it may be advisable to confine such children as have never had them to a vegetable diet, giving a gentle aperient once or twice a week. Children thus prepared may be likely to have a mild disease.

The plague.

This is a fever of a putrid and very contagious nature, in the progress of which extreme debility, buboes, carbuncles, petechiæ, hemorrhages, diarrhœa, and other such symptoms arise. Among the most obvious causes of this terrible and devastating disease, besides contagion, are the use of corrupt or damaged grain, putrid fish, and other animal substances, noxious exhalations arising from stagnant waters, or slimy mud, a residence in confined situations where the current of air is obstructed, and the want of due cleanliness.—The disease attacks persons of all ages and both sexes indiscriminately; but women, young people, and infants at the breast, have been observed in general to resist infection more than robust men. Those who, during the French campaign in Egypt, were exposed to vicissitudes of heat and cold, such as bakers, cooks, and smiths, were noticed to be more particularly attacked by it.

Prevention of the plague.

It will be necessary to keep the mind cheerful, and as free from all apprehension and anxiety as possible; and carefully to avoid intemperance, sensuality, great fatigue, profuse evacuations, a poor vapid diet, or whatever else may tend to produce debility. By strengthening the bodies of men, it is supposed they will thereby be enabled to resist contagion the better, cold bathing is, therefore, recommended every morning, with two or three doses daily of some tonic medicines; such as the Peruvian bark. If wine is used at all it should be sparingly; the less perhaps the better.

Nurses, and medical attendants, who are immediately exposed to the contagion, should be careful to come into immediate contact with the diseased as seldom as possible; and they ought never to inhale the breath of the sick, nor place themselves in such a direction, as that a guest of air can waft the miasma or effluvia towards them. It would be advantageous likewise, to anoint the hands with sweet oil.

For the purpose of destroying the contagion the sick should be removed to lazarettos; and these must be guarded, so as to cut off all unnecessary communications with those in health. The atmosphere surrounding the infected, should be purified as much as possible, by a strict attention to cleanliness, a free ventilation, and frequent fumigations with the nitrous or muriatic acid, in the form of gas. All substances capable of being impregnated with the effluvia, and of vitiating the atmosphere, should be speedily removed from the apartments of the sick, to situations where they will be made to undergo proper purification.

It does not signify which of the acids we employ, as they are both equally efficacious in destroying every species of contagion. If a preference be given to the muriatic, place a saucer, or any other earthen vessel, containing about half a pound of common salt, in the apartment of the sick, and pour over it, from time to time, a sufficient quantity of vitriolic acid, to moisten the whole of the salt. If the nitrous is preferred, put half an ounce of vitriolic acid into a cup, saucer, or glass, and add from time to time, some nitre, reduced to powder. In rooms from fifteen to twenty feet in dimensions one vessel will be sufficient; but in larger ones, two or more will be requisite; and when the air is foul, and peculiarly offensive, it will be advisable to apply a slight degree of heat under the vessels, in order to extricate a larger quantity of vapour.

Prevention by vaccination.

Doctors Aubreu and Lafont, physicians at Constantinople and Salonica, have lately discovered that vaccination is a preventive for the plague. Of six thousand adults *vaccinated*. none caught the contagion; even infants who who were vaccinated continued to suckle mothers who were labouring under the attacks of the plague without being infected. An Italian physician, who is studying in Turkey the symptoms of this dreadful complaint, inoculated himself with matter drawn from a person who had died of the plague, and afterwards underwent vaccination, without the contagion developing itself, though he put himself in all possible points of contact with infected persons in the hospitals.

By friction with olive oil.

An extraordinary effect of olive oil is reported by Mr. Baldwin, the British Consul at Smyrna, who observed that amongst the numerous tribe of oil porters, none were infected with the plague. Led by this hint, he proposed unction of the body with oil to keep off the plague; and the following was the result of the first trial:—In 1792, 22 Venetian sailors, lived five days with three infected persons, all of whom died; but the 22 sailors, who had been repeatedly anointed with the oil, remained free from the infection. Three Armenian families, consisting of 27 persons, occupying the same floor, closely attended the sick of the plague, but being daily rubbed with oil, were preserved from the infection. The nurses in the hospitals of Smyrna, who attend the sick night and day, have, by the same methods, been happily preserved from contagion.

After this the oil was employed in the first stages of the plague at Smyrna, and with the happiest success. The body was rubbed all over with tepid olive oil. A wine-pint was esteemed sufficient to effect a cure.

It is a curious coincidence, that this use of oil is mentioned in the bible. "Let the sick be annointed with oil, and saved." The caffres, who constantly smear the body with lard or oil, remain free from the yellow fever; and the Esquimaux tribes, who also regale on seal oil remain also free; and when the plague raged in London, tallow melters and butchers were found exempt.

Instead of clogging up the pores, as might be suspected by some, the pores became open, and the oil produces a salutary perspiration.

Remedy for the plague.

Of all the remedies which have been tried to oppose the contagious scourge which, in 1820, desolated the colony of the Isle of France (the Mauritius,) the following mixture was productive of the most salutary effects; it is composed of two drachms of camphor, dissolved in an ounce of sulphuric ether, and beaten into a bottle of olive oil. Two table-spoonsful of this mixture were taken every half hour; accompanied by softening and mucilaginous drinks in abundance, also by clysters of the same nature. This very simple treatment not only arrests the progress of this terrible malady, but even destroys all germs of it; of 36 negroes, to whom M. Galemar administered the medicine, 34 were saved.—*Annales Maritimes*, &c. 1820.

The internal use of olive oil.

The external use of oil of olives, as a preservative against the plague, has been long known in the Levant; it has been applied by fomentations, frictions, and lotions; but no one has hitherto taken it as an internal remedy, by drinking it. This discovery was made in 1819. The first experiment was made upon 200 persons, out of whom there were not 10 in whom it did not prove efficacious. As soon as the infection is caught, from 4 to 8 ounces of oil of olives should be taken at once, according to the strength, &c. of the constitution. Universal sweating will then take place, and in such abundance, that it appears to expel the virus, even alone; at least this has occurred in many instances. Its effects, however, as a sudorific, may be properly seconded, by taking a decoction of elder berries. In some individuals, the oil operates as an emetic, in others it purges the bowels. But sweat or excessive perspiration, is usually the principal symptom, and also the most beneficial. The Moors, notwithstanding their superstitious aversion to all internal remedies, especially with respect to the plague, acquiring knowledge from experience, have at length had recourse to this simple remedy. In a village near Tangier, a father of a family, who had lost by the plague his wife and four children, saved his own life and those of four other children, by using the oil. At Tangier, two negresses survived the contagion by taking a strong dose, though these are the first examples of any of their colour thus braving the contagion. Many additional facts from the interior of the country, confirm the trials already made, and those which are daily making. To render the remedy still more efficacious, the oil is used both internally, by drinking, and externally, by frictions, washings, &c. Scarcely an instance has occurred wherein this double application has failed of its effect. A Spanish physician, who has been upwards of a year in Africa, has hereby cured almost all the Jews in Tangier.

Of three hundred persons who have been attacked, since the beginning of the year 1820, and who have had recourse to this remedy, scarcely to a dozen has the malady proved fatal.

To disinfect letters.

The best method of disinfecting letters, and other articles coming from places that are supposed to be visited by the plague, is to expose them to the fumes of burning sulphur, mixed with saltpetre.

DISEASES OF METALLIC ARTISTS.

In the application of metals to the different arts, the persons employed, are often injured to a great degree, by some of the particles entering their bodies; either in consequence of being swallowed along with the spittle, drawn in along with the breath, or absorbed by the pores of the skin. For the benefit of such persons, therefore, we shall here give a short account of the principal disorders to which they are severally exposed, together with some plain and general directions, respecting the prevention and cure.

From gold.

As the mischief which is done to the constitution by gilding, proceeds entirely from the mercury employed in the process, we shall reserve what we have to say thereon, until we come to treat of the effects of that peculiar metal.

From copper.

The makers of verdigris and verditer, painters who mix this last preparation with oils, and braziers, but in a slighter degree, are liable to take in some cupreous particles which disorder the constitution somewhat in the same manner as lead. They acquire a sallow countenance, their hair becomes greenish, with which colour their spittle, (which has besides, a brackish taste,) and excrements, are likewise tinged. They waste away, and become prematurely old. They are affected with trembling of the limbs, and pains and twitchings in the stomach and bowels, which last, however, are not always constipated, as is the case from lead, but are sometimes, on the contrary very loose.

Prevention.

Such persons should take care not to throw out their spittle during their work, and never neglect to wash their hands and face, and even change at least a part of their clothes, such as their coats and waistcoats, when they leave off. It would be a great convenience, in point of cleanliness, and a great advantage in point of health, for all such persons to put on something like a waggoner's frock while at work, laying it aside again when they have done. This would be found, in the end, to be a great saving in clothes, and, what is still more desirable, a great saving in physic. These remarks will apply equally to those who work at any other of the injurious metals.

Remedies.

For the above-mentioned complaints, after they have once come on, mild and softening methods will generally answer best; such as the use of broths, gruel, or milk and water. If there is much uneasiness at the stomach, some chamomile tea should be taken, so as to occasion vomiting. If the pains and twitchings are violent, a draught of peppermint water, with fifteen or twenty drops of laudanum, will be proper; and if the bowels are bound, some senna tea should be taken, or what is still better, an electuary, composed of an ounce of lenitive electuary, and half an ounce of flowers of brimstone, mixed up with some syrup of marsh-mallows. A tea-spoonful, or the size of a walnut, to be taken till it produces a stool or two. But, on the other hand, if, as it sometimes happens, there should be a purging, the peppermint draught with laudanum, above-mentioned, should be repeated every three or four hours, until it is checked. After the pain has been removed, and the bowels have been sufficiently cleansed, by keeping them moderately open, a tea-spoonful of the Peruvian bark, in powder, may be taken twice a day, in a glass of cold water, for about a week, care being taken that it does not bind up the body, for, if it has that effect, it will not lie properly on the stomach. Those who dislike the electuary, may take some magnesia and rhubarb in its place.

From iron.

During the forging and hammering of iron, the scales which fly off frequently get into the workmen's eyes, and if not quickly dislodged, occasion great inflammation and pain.

Prevention.

The common methods of removing them are, washing the eyes with cold water, or pricking them out with a needle, in performing of which some workmen are very dexterous; but these methods sometimes fail, in which case, recourse must be had to the magnet, which will frequently succeed, and is then found the easiest and most expeditious extractor.

Remedies.

If any inflammation should remain, the eye may be washed afterwards with a cooling eye-water, made by dissolving 15 grains of white vitriol in half a pint of cold water.

From polishing irons, &c.

The disorders of grinders of iron, being produced by the particles of the stones, and not of the metal, (in the same way as those of the men who break stones and flints on the road side) are to be prevented, as far as the eye is concerned, by wearing a piece of net-lace over the rims of a pair of spectacles, so as to form a hollow or concave surface next the eye. Polishers and steel-grinders, from the gseat use of emery and oil, are very subject to indisposition of the stomach and bowels. The general symptoms are oppression of the stomach, costiveness, and frequently pain in the bowels: but they are easily removed by a gentle vomit, giving, the next morning, some opening physic, and taking plentifully of broths, &c. When the pain continues after the purgative, it may be removed by giving oily purging mixtures, with the addition of a little laudanum.

From pointing needles.

A method has recently been adopted with much advantage by the pointers of needles, of suspending a magnet over the work, so as to attract the minute particles of steel, immediately as they fly off from the needles; and it has been ascertained that this simple invention will have the effect of preventing pulmonary consumption, from this cause, among needle manufacturers. It is well known that the lungs of the persons employed in this business, as well as those of flax-dressers, are particularly liable to inflammation from the entrance of the minute particles of the materials they work upon. These particles continually float in that part of the atmosphere which they are under the necessity of inhaling.

From tin.

The inconveniences which happen to pewterers, enamellers, and all those that are anywise employed in the melting of tin, either by itself, or along with other metals, proceed chiefly from the particles of arsenic which it contains, and will be more properly noticed amongst the effects of that metal.

From lead.

Lead miners, plumbers, letter-founders, refiners, makers of ceruse, painters, &c. are subject to a peculiar kind of colic, called *the dry belly-ache*, which often ends in palsy of the upper, and sometimes of the lower, limbs of the body. This disorder, which is occasioned by the particles of lead, is marked by the following symptoms.

The countenance becomes sallow, the appetite fails, with an uneasiness and sickness at the stomach, and great costiveness; the pain, which is greatest about the naval and loins, comes on by degrees, increasing, at length, to such a violent pitch, as to cause frequent vomiting, and, in many cases, a drawing in of the belly at the navel, where it feels hard, and cannot bear to be pressed.

Remedies.

Under these circumstances, the first thing to be done is, to take some chamomile tea, so as to provoke vomiting, and thereby clear the stomach; after which, 20 drops of laudanum should be swallowed in a glass of water, and repeated every two or three hours, until the pain is abated or sleep brought on. If, on waking, the pain returns, the laudanum draughts must be repeated again in the same manner. By pursuing this mode of treatment for three or four days, during which time the patient must be supported by broths, and other spoon-meats, the pain and the hardness of the belly are generally removed, so as to allow of the employment of purging medicines, of which the mildest sorts usually answer best; such as a drachm of cream of tartar, or two drachms of Epsom or Glauber salts, dissolved in a little warm water or senna tea, and taken every two hours until the bowels are opened. Some recommend for this purpose castor oil; half an ounce or six drachms of it may be swallowed for a dose, in a glass of peppermint; there being no occasion to mix it up, as is commonly directed, with the yolk of an egg. As much as an ounce of it at a time, has been given to some patients; but in such quantities the stomach is seldom able to retain it. Should the pain still return, the laudanum draughts should be again employed, and if these are not effectual, opiate clysters should be likewise administered. To obviate the costiveness, which sometimes lasts a long time, and which, if not carefully removed, brings on a relapse, some gentle opening physic must be used daily, such as cream of tartar, senna tea, or the electuary, with flour of brimstone, as mentioned already, in treating of the effects of copper.

Prevention.

In order to defend themselves from the bad effects of lead, all those that are in any manner exposed to its daily influence, should eat some fat broth or bread spread thick with butter or lard, before they enter upon their work. It is with the same intention that some have recommended a glass of salad oil, with a little brandy, to be taken fasting. In other respects, the precautions concerning cleanliness, as noticed under the article copper, are equally proper here.

The mill-reek.

This dreadful disease is caused by the poisonous fumes of melted lead, which affect not only those who are employed in the smelting or preparing of that metal, but likewise all who reside near the mines whence it is dug, or contiguously to the furnaces, &c. where it is worked.

On the first attack of this disease, which is of a similar nature and origin with the Devonshire colic, the patient feels a weight and uneasiness in the region of the stomach, and a slight degree of colic in the bowels: the pulse is low; the appetite impaired; the legs become feeble, and the whole body is debilitated. Sometimes these symptoms abate in consequence of a slight diarrhœa; though, if the latter continue for some time, it is always attended with danger.

At first, however, the patient is not prevented from following his usual occupations; but if the disorder progressively increase, and he neglect to apply for relief, the next symptoms will be, obstinate costiveness, violent pain in the intestines; a troublesome giddiness, insensibility, and delirium. The extremities become convulsed; the pulse intermits; and, at length, the highest degree of palsy, or apoplexy, closes the distressing scene.

Prevention.

The following precautions are recommended to those persons who are in any manner connected with the manufacture of lead, or who reside in the vicinity of lead mines.

1. No labourer should be suffered to repair to his work, fasting; his food ought to be fat and oily; and it would be very beneficial, if he were to drink a glass of sweet oil, either pure, or mixed with a little brandy, every morning.

2. It will be advisable to take some aperient physic, not only in the spring and in autumn, but likewise as often as any symptoms of the mill-reek, however slight, are perceived.

3. No spirituous liquors should be allowed, or, at least, very sparingly used, especially while the labourer is at work, or immediately after it.

4. No workman in a state of perspiration must expose himself to the cold air; but he should retire to his home, as speedily as possible; and, after having changed his clothes, cool himself gradually.

5. Immediately after the labourer returns from his work, he ought to take some nourishing aliment, which should principally consist of fat broths, or similar liquids.

6. The diet should be wholesome and nourishing; because scanty or poor food disposes such persons to be more frequently affected, and renders them too feeble to undergo a complete cure.

Lastly, as often as their employment will permit, they ought to visit an open country, where they may breathe an untainted air, and find provisions free from the noxious fumes of lead. Particular care must, however, be taken not to venture upon long journeys; because such persons will be more fatigued, and reduced by travelling one day, than by labouring two days in the lead-mines.—The medicines, &c. to be taken, are the same as those just prescribed under the head of LEAD.

Cautions to glaziers, painters, and plumbers.

The following medical cautions were recommended by the physicians and surgeons of the Bath Hospital, to those who have received benefit by the use of the Bath waters, in cases where the poison of lead is concerned, as plumbers, glaziers, painters, and other artificers, who work in trades which expose them to similar hazards, from the same cause; to be observed by them at their return to the exercise of their former occupation.

1. To maintain the strictest temperance, particularly respecting distilled spirits, which had better be altogether forborne.

2. To pay the strictest attention to cleanliness; and never suffer paint to stick about to daub their hands: and particularly never to eat their meals, or go to rest, without washing their hands and face with soap, perfectly clean.

3. Not to eat or drink in the room or place wherein they work; and much less to suffer any food or drink to remain unused, even for the shortest space of time, in any part of the room while painting, or where colour stands; and not to work on an empty stomach.

4. As the clothes of persons in this line (painters particularly) are generally much soiled with colour, it is recommended for them to perform their works in frocks of ticking, which may be frequently washed, and conveniently laid aside, when the workmen go to their meals, and again put on when they resume their work.

5. Every business which can, in these branches, should be performed with gloves on their hands; painters, in performing clean light work, would find gloves an inconvenience; but to avoid the evil here mentioned, the handle of the brush should be often scraped. Woollen or worsted gloves are recommended, as they may, and should be often washed, after being soiled with the paint, or even with much rubbing against the metal.

6. Caution is necessary in mixing, or even in unpacking, the dry colours, that the fine powder do not get into their mouths, or be drawn in by the breath. A crape covering over the face might be of service; but care should be taken to turn always the same side of the crape, towards the face, and to clean or wash it frequently.

7. All artificers should avoid touching lead when hot; and this caution is especially necessary for printers or compositors, who have often lost the use of their limbs by handling the types, when drying by the fire, after being washed.

8. Glaziers' putty should never be made or moulded by the hand. An iron pestle and mortar would work the ingredients together, at least equally well, and without hazard. It is necessary in working putty to handle it, nor is it usually pernicious; cleanliness is therefore the best recommendation.

9. If any persons, in any of the above employments, should feel pain in the bowels, with costiveness, they should immediately take 20 drops of laudanum, and when the pain is abated, two table-spoonsful of castor oil, or an ounce of the bitter purging salt, dissolved in warm chamomile tea. If this does not succeed, a pint or two pints of warm soap-suds, should be thrown up as a clyster.

10. As a preventive, two or three spoonsful of salad oil, taken in a small cup of gruel, is likely to be of service, if taken daily, and steadily pursued.

From mercury.

The fumes of this singular metal, to which gilders, looking-glass makers, preparers of vermilion, sublimate, &c. are particularly exposed, disorder the body in a frightful manner. The chief complaint which they induce, is a trembling and a palsy of the limbs; but these are accompanied with many other distressing symptoms.

The countenance looks heavy, pale, and yellow; the gums are corroded, and easily bleed; the teeth, which are turned black, become loose, and sometimes fall out; the inside of the mouth is covered with ulcers, and there is a continual flow of spittle. The breath is very fœtid, and the respiration is obstructed; the neck, arms, and legs are affected with tremblings, and, at length, become quite paralytic. Along with all this, there is commonly some degree of stammering, and now and then a total loss of speech; together with deafness, and a general dulness and stupor of the senses. Such persons, unless they change their employment, seldom live to an old age.

Remedies.

The cure of these formidable complaints consists, first of all, in expelling the mercurial particles out of the body, which is chiefly done by means of sweating: and, afterwards, in employing proper medicines, to remove the spasms and weakness of the limbs.

After giving an emetic, the first intention is answered by going into the warm bath, and then, after being laid in bed between the blankets, taking a dose of Dover's powder, the operation of which must be assisted by drinking, every now and then, a little warm gruel, tea, or weak wine-whey.

Care must be taken to keep in bed as long as any sweat comes out; and, after getting up, not to go into the cold air. This sweating plan must be persisted in for some time, repeating it, at first every night, then every other night, and towards the end, twice or only once a week. During this, some of the decoction of the woods, may be taken in the daytime. After the sweatings, if the body should be bound, it must be opened by some senna-tea, or by the electuary with flower of brimstone, already described. The food should be light, but nourishing, consisting chiefly of milk, broths, and puddings.

After the mercurial particles have been thus expelled, which is known by the disappearance of the most distressing symptoms, the warm bath and sweating powder may be laid aside; and bracing and strengthening medicines may now be employed. Amongst these, the best for this purpose, are pills composed of equal parts of the albanum pills and extract of gentian, viz. a drachm of each, beat up together, and divided into twenty-four pills; of which three are to be taken night and morning. Electricity is likewise of use. If much weakness should remain notwithstanding these medicines, half a drachm of powdered bark may be swallowed down in a glass of cold water, twice a day; taking care, at the same time, that it does not occasion costiveness. At this time, the cold bath and steel medicines will be likewise proper.

Prevention.

Gilders should be particularly careful to turn their heads aside as much as can be, during their work; for, by carefully attending to this they would escape most of the fumes. They should, moreover, always contrive, as much as possible, by opening the windows or door of the place where they are at work, to have a current of air from behind them towards the chimney: where this could be managed, especially if a brisk fire were at the same time kept up, the mercurial fumes, instead of being diffused in the atmosphere around them, would be immediately carried away in a body up the chimney.

Diet, &c.

With regard to the diet of such people, it should be nourishing, but quite temperate. Whenever they feel themselves much disordered they should take an emetic; and they should always be careful to keep their bodies moderately open.

It is no unusual practice with persons employed in working quicksilver mines, to put on gloves, and masks furnished with glass eye-holes; gilders would do well to imitate them in both these respects. They can have no objection to follow the first, and a little reflection will serve to convince them of the propriety of overcoming every prejudice against the last of these precautions.

From Arsenic.

Many of the ores of silver, and some of those of tin, antimony, &c. contain a portion of arsenic, to the vapours of which the workmen are exposed, during the pounding, roasting, and smelting of those metals. The same thing happens, likewise, in the melting of pewter, enamels, and all compound metals, in which arsenic is used as an ingredient.

In whichsoever of these ways, the arsenic fumes come to be applied to the human body, they never fail to disorder it to a violent, and even dangerous, degree. When they are not applied in such considerable quantity as to prove an immediate poison, they operate so as to undermine the constitution, in a slow but effectual manner.

They seem to act chiefly on the nervous system, inducing a constant feverish state, with loss of appetite, sickness, and occasional vomiting, and daily wasting away of the flesh. The stomach and bowels are often tormented with twitching pains, and there is a general trembling of the limbs, with giddiness, and head ache; the breathing is, moreover, very much disturbed, and a distressing asthma is often brought on. Unless they are checked in due time, these symptoms go on increasing till the hectic fever becomes confirmed, and then the patient dies consumptive.

Remedies.

For the mitigation or removal of these complaints, it will be proper to take a gentle emetic of chamomile tea, or ipecacuanha, and afterwards keep the body open by mild purges, such as senna-tea, or the electuary of brimstone. When there is much costiveness, or any great fulness, or swelling of the belly, a clyster should be thrown up; a gentle sweat should likewise be kept up, by the frequent use of small quantities of warm decoctions of barley, milk and water, or linseed-tea, and at night, especially if there is much pain or twitching of the stomach or bowels, fifteen or twenty drops of laudanum may be taken in a draught of any of the liquids just mentioned. The warm bath may be also employed with advantage. It will be of great service, too, to take, once or twice a day, for some length of time, small doses, such as fifteen or twenty grains of flour of brimstone, mixed up with a little milk. A French physician has recommended, in these cases, the liver of sulphur; it may be made up into pills, and given in the dose of four or five grains, with a draught of warm water after it.

Remedies and prevention.

The diet should be the same as that prescribed for gilders; that is, to consist chiefly of milk. For restoring the strength and completing the cure, bitters and steel medicines should be employed, viz. pills composed of a drachm of extract of bark, half a drachm of extract of gentian, and 15 grains of salt of steel, beaten up together into twenty pills; three to be taken night and morning. All that has been said under the article Mercury, respecting cleanliness, and the other means of prevention, applies with equal propriety here.

DISEASES PECULIAR TO FEMALES.

Hysteric fits.

This complaint called also the *hysteric passion,* appears under various shapes, and is often owing to a lax tender habit, obstructions of the menses, fluor albus, &c.

In the fit, the patient is seized with an oppression in the breast, and difficult respiration, accompanied with a sense of something like a ball ascending into the throat, which puts her under great apprehensions of being suffocated; there is a loss of speech, and generally violent convulsive motions. These, with a train of hypocondriac symptoms, are sufficient to determine the disease; to which may be added, frequent laughing and crying, and various wild irregular actions: after which a general soreness over all the body is felt; the spirits are low; the feet are cold. The urine is clear and limpid, and discharged in great quantity. The hysteric fit may be easily distinguished from fainting; for in this the pulse and respiration are entirely stopped; in that they are both perceivable.

Cure and prevention.

Nothing recovers a person sooner out of the hysteric fit than putting the feet and legs in warm water.

When low spirits proceed from a suppression of the piles or the menses, these evacuations must be encouraged, or repeated bleedings substituted. When they take their origin from long continued grief, anxious thoughts, or other distresses of mind, nothing has done more service, in these cases, than agreeable company, daily exercise, and especially long journeys, and a variety of amusements.

Regimen.

A light animal food, red wine, cheerful company, and a good clear air, with moderate exercise, are of great importance in this disorder. Drinking tea, and such like tepid relaxing fluids, should by no means be indulged.

The cure consists in whatever tends to strengthen the solids, and the whole habit in general; and nothing will effect this more successfully than a long-continued use of the mineral chalybeate waters, and riding on horseback.

Anti-hysteric spirits.

Take of proof spirit, 1 pint, sal ammoniac, 2 oz. assafœtida, 6 drachms, potash, 3 ounces. Mix them, and draw off, by distillation, 1 pint, with a slow fire.

The spirit is pale when newly distilled, but acquires a considerable tinge by keeping. The dose is a tea-spoonful in some water, during hysterics, and the same to be taken occasionally.

Anti-hysteric pills.

Take of compound pills of galbanum, 2 dr. rust of iron, 4 scruples. syrup of ginger, as much as is sufficient. Form a mass, which is to be made into 40 pills, of which take 4 at noon, and at seven in the evening, every day, drinking after them half a glass of port-wine. These pills are excellent in hysteric affections.

Fœtid enema.

This is made by adding to the ingredients of the common clyster, 2 drachms of the tincture of assafœtida.

In cases of hysterics and convulsions, the fœtid enema is of singular use.

Opiate draught.

Mix together, cinnamon water, 1 oz. spirit of caraways, 1-2 oz. sulphuric ether, 1-2 dr. tincture of castor, 1-2 drachm. Let this draught be taken every six hours, if the stomach should be affected by cramp. If the feet are cold, bottles filled with warm water should be applied to them.

Tonic for debility in females.

Take of soft extract of bark, 2 drachms, columbo, rust of iron, each 1 do. simple syrup, as much as is sufficient. Make into 50 pills; take 2, and gradually increase to 5, three times a day.

Compound galbanum pills.

Take of galbanum, oppoponax, myrrh, sagapenum, each, 1 oz. assafœtida, 1-2 oz. syrup of saffron, as much as is sufficient. Beat them together. These pills are excellent as anti-hysterics, and emmenagogues: 1-2 a scruple, or more, may be taken every night or oftener.

Compound spirit of lavender.

Take of spirit of lavender, 3 lbs. spirit of rosemary, 1 lb. cinnamon, 1-2 oz. nutmeg the same, red sanders, 3 drachms. Digest for 10 days, and then strain off. This is often taken upon sugar, and is a salutary cordial, far preferable to drams, which are too often had recourse to, by persons feeling a great sinking or depression of the spirits.

Infusion of senna, with tamarinds.

Add to the infusion of senna, before it be strained, an ounce of tamarinds; then strain. This forms a mild and useful purge, excellently suited for delicate stomachs, and inflammatory diseases. The taste of the senna is well covered by the aromatic sugar, and by the acidity of the tamarinds. An ounce is a convenient purge.

Mild purgative.

Take of manna, 2 oz. tamarinds, 1 oz. rose water, 8 oz. Boil the rose water and tamarinds together for a quarter of an hour, then add the manna. Three table-spoonsful to be taken every 3 hours, until a motion is obtained. Less is to be given to a child.

Medicinal virtues of prunes.

These contain much mucilaginous and saccharine matter, and their medical effects are, to abate heat, and gently loosen the belly, which they perform by lubricating the passages, and softening the excrement. They are of considerable service in costiveness, accompanied with heat or irritation, which the more stimulating cathartics would tend to aggravate; where prunes are not, of themselves, sufficient, their action may be promoted by joining with them a little rhubarb, or the like, to which may be added some carminative ingredient, to prevent their occasioning flatulency. Prunes enter properly into the composition well known by the name of lenitive electuary; and even taken alone, in some constitutions, they gently open the body. The French prunes are the best. For weak and delicate females, particularly during the time of gestation, stewed prunes are invaluable, as an effectual but gentle aperient medicine.

Fluor albus, or whites.

The fluor albus is a flux of thin matter, of a pellucid or white colour; sometimes it is greenish or yellow, sharp and corroding, often foul and fœtid; especially if it be of any long standing.

Tedious labours, frequent miscarriages, immoderate flowings of the menses, profuse evacuations, poor diet, an inactive and sedentary life, are the causes which generally produce this disease.

Regimen, &c.

The diet should be nourishing: milk with isinglass boiled in it, jellies sago, broths, and light meats, red port wine in moderation, Chalybeate waters, moderate exercise, and frequent ablution of the parts should be recommended. A standing posture of body long continued, violent dancing, or much walking, must be forbidden.

Astringent injection.

To restore tone to the parts, it will be necessary three or four times a day, to inject a portion of the following mixture, by means of a syringe.

Rub together in a mortar white vitriol, 1 drachm, sugar of lead, 10 grains, water 2 drachms. Mix the whole with a pint of distilled water.

Another.—Mix together 1 drachm of powdered alum, with 1 pint of decoction of oak-bark—Inject as above.

Tonic and astringent pills.

Take of gum kino, and extract of Peruvian bark, each, 1 drachm, grated nutmeg, 1 scruple, powdered alum, 1-2 drachm, syrup, in sufficiency to form a mass, which is to be divided into 36 pills. Three of these are to be taken at eleven, forenoon, and five in the afternoon, being taken two hours before dinner, three hours afterwards washed down by a glassful of good port wine. Recourse may at the same time be had to tincture of Peruvian bark, to preparations of steel, and mineral waters.

Prevention.

Females afflicted with this disorder should by no means indulge in the too free use of tea, or other warm slops of a relaxing nature. They should sleep on a matrass, rise early, and take such exercise as may be convenient, and, if possible, on horseback. Cold bathing should also be used as often as convenient. In winter, a flannel shift ought to be worn.

Immoderate flow of the menses.

When the menses continue too long, or come on too frequent for the strength of the patient, they are said to be immoderate, and are generally occasioned by weak vessels, thin blood, or a plethoric habit. This often happens in delicate women, who use enervating liquids too freely, especially tea. It also arises in consequence of abortions, and sometimes attends women who are obliged to work hard.

Venesection may be resorted to, when the patient is of a full and robust habit; and, where the hæmorrhage is excessive, opiates are of great use.

Astringent fomentations.

Astringent fomentations may often be very properly prescribed. Cloths dipped in decoction of oak or Peruvian bark, with the addition of a small quantity of brandy, or red wine and vinegar, will answer the purpose extremely well.

Laxative mixture.

It will, in general, be sufficient to keep the body open by gentle laxatives, as the following:

Take of Epsom salts, 1 oz. syrup of roses, 1 dr. compound tincture of senna, 2 dr. water, 3 oz. Let a wine glass of two table spoonsful of this mixture be taken every four hours, till it operates. The patient should likewise drink freely of lemonade, or other acidulated beverages. She should lie on a matrass, lightly covered with clothes, and avoid an erect posture: the chamber being at the same time kept of a moderate temperature.

Astringent draught.

Take of laudanum, 1 dr. tincture of kino, 4 dr. powdered alum, 1 dr. decoction of Peruvian bark, 6 oz. Shake these together in a bottle, and let the patient take a fourth part every 4 hours.

Astringent injection.

Where the hæmorrhage is profuse, and resists the usual means now recommended, it will be necessary to throw up the following astringent injection into the uterus from time to time. Take of decoction of bark, I pint, alum in powder, 3 drachms. Mix, and use as an injection, 3 times, if necessary.

Regimen, &c.

To confirm the cure and prevent a relapse, the body should be strengthened by proper exercise, mineral waters, a light but nourishing diet; such as light broths, red port wine in moderation, and an easy cheerful mind.

When an immoderate flux of the menses, or floodings after abortion, is either attended with or preceded by acute pain, not inflammatory, in the lower part of the back or belly, and returns with greater violence, as the discharge comes on, opium will, in such a case, answer better than astringents; and may be given in clysters composed of 3 oz. of infusion of roses, with a drachm of laudanum.

Green sickness.

This disease is commonly attended with plethora, listlessness to motion, a heaviness, paleness of complexion, and pain in the back and loins, also hæmorrhages at the nose, pains in the head with a great sense of weight across the eyes, loathing of food, a quick and weak pulse, fluor albus, hectic heats, coughs, and hysteric fits.

There is often indigestion and costiveness, with a preternatural appetite for chalk, lime, and other absorbents.

Regimen &c.

The diet ought to be nutritive and generous, with a moderate use of wine. Exercise ought also to be daily used, and particularly on horseback. The mind should likewise be kept amused by associating with agreeable company. A course of the Bath or Tunbridge waters, will also be found exceedingly beneficial, as will likewise a frequent use of the warm bath heated to about 80 degrees.

Chalybeate pills.

Mix together extract of bark, and sulphate of iron, (green vitriol) each 1 scruple, subcarbonate of soda, 15 grains, powdered myrrh, 30 grains. Add syrup of ginger to form the whole into a mass, which divide into 34 pills. After the stomach has been well cleansed by a gentle emetic, two of these are to be taken two or three times a day, taking care to wash them down with nearly a wine glassful of the following.

Tonic draughts.

Mix together, compound tincture of Peruvian bark, and compound tincture of cardamoms, each, 1 oz. compound infusion of gentian, 1 pint.

Chalybeate draught.

Pour 15 drops of tincture of muriate of iron into a glassful of cold water, or a decoction of Peruvian bark. Drink this twice or thrice a day, an hour before, or 2 hours after eating.

Tincture of iodine.

In many cases of green sickness, attended with symptoms of approaching consumption, and also in incipient phthisis, the saturated, tincture of iodine may be administered with great effect.

When taken internally, it is very beneficial in dispersing wen. Ten drops of the saturated tincture, taken three times a day, will effectually remove the complaint, in the course of five or six weeks.

Cessation of the menses.

The constitution undergoes a very considerable change at the critical period when menstruation ceases; and it often happens that chronic, and sometimes fatal complaints arise, if care is not taken when this natural discharge terminates. It seldom stops all at once, but gradually ceases, being irregular both as to quantity and time.

Regimen, &c.

When the disappearance is sudden, in females of a plethoric habit, malt-liquors, wine, and animal food ought, for a time, to be excluded from their diet. They should likewise avoid all liquors of a spirituous nature. Regular exercise should be taken, and the body constantly kept open by the electuary of senna, Epsom salts, or any other mild laxative medicine.

If giddiness and occasional pains in the head, affect the patient, or if there be a visible fulness in the vessels, the application of leeches to the temple, will be found very beneficial; and if ulcers should break out in the legs, &c. they ought by no means to be healed up, unless a salutary drain, by means of an issue, be established in some other part.

Dropsy.

The following recipe was given to the late Countess of Shaftesbury by the Prior of the Benedictine Monastry of Corbie, in Picardy.

Take of broom-seed, well powdered, and sifted, 1 dr. Let it steep twelve hours in a glass and a half of good rich white wine, and take it in the morning, fasting, having first shaken it so that the whole may be swallowed. Let the patient walk after it, if able, or let her use what exercise she can without fatigue, for an hour and a half; after which, let her *take 2 oz. of olive oil*; and not eat or drink any thing in less than half an hour afterwards. Let this be repeated every day, or once in three days, and not oftener till a cure is effected; and do not let blood, or use any other remedy during this course.

Nothing can be more gentle and safe than the operation of this remedy. If the dropsy is in the body, it discharges it by urine, without any inconvenience: if it is between the skin and flesh, it causes blisters to rise on the legs, by which it will run off; but this does not happen to more than one in thirty: and in this case no plaisters must be used, but apply red cabbage leaves. It cures dropsy in pregnant women, without injury to the mother or child. It also alleviates asthma, consumption, and disorders of the liver.

Another for the same.—Dissolve an ounce of saltpetre in a pint of cold water; take a wine-glassful every morning and evening; 6 oz. will perfect the cure in about six weeks.

For vomiting during pregnancy.

The morning sickness is one of the most painful feelings attendant on the pregnant state; and it is one of those which medicine commonly fails to relieve. A cup of chamomile, or peppermint tea, taken when first waking, and suffering the patient to lie still for an hour, will sometimes alleviate the distressing sickness; but should it recur during the day, these means seldom succeed.

Two or three spoonsful of the following mixture should be taken, either occasionally or when the vomiting and heartburn are more continual, immediately after every meal;—

Take of calcined magnesia, 1 dr. distilled water, 6 oz. aromatic tincture of rhatany, 6 dr. water, pure ammonia, 1 dr. Mix.

Another.—Dr. Scellier extols the following mixture as a remedy for nausea and vomiting, during the period of pregnancy. Take of lettuce-water, 4 oz. gum arabic, 1 scruple, syrup of white poppies, syrup of marshmallow root, each 2 oz. Prussic acid, 4 drops. Let an apothecary prepare this mixture. A table-spoonful is to be taken every half hour when the vomiting is present.

If the lettuce-water cannot be obtained, 8 grains of the inspissated white juice (lactuarium,) dissolved in 4 oz. of water, may be substituted for it.

Another.—The saline mixture, in a state of effervescence, with a pill of 1 or 2 grains of *lactuarium,* is by some preferred to the above composition. When the matter brought up is acid, a weak solution of the carbonate of soda may be substituted for the saline mixture.

To relieve sickness and qualms in pregnancy.

Take of infusion of quassia, 1 oz. cinnamon water, 4 dr. compound spirit of ammonia, 20 drops, prepared oyster shells, 2 gr. Make into a draught to be taken at 12 and 7 o'clock every day.

For heartburn during pregnancy.

Take of solution of ammonia, calcined magnesia, each 1 dr. cinnamon water, 2 oz. common water, 6 do. The dose is a table-spoonful as often as required.

Head-ache.

When head-ache or drowsiness prove troublesome to a pregnant woman of robust habit, a few ounces of blood should be drawn from the arm. If she be of a weak or irritable habit, leeches ought to be applied to the temples. In both cases the bowels should be opened by Epsom salts, or some other gentle laxative medicine.

Hysteria.

When hysteria, or fainting occurs, the pregnant patient should be placed in a horizontal position, in the open air. When she is a little recovered, a glass of wine, in a little cold water, should be administered, or, what is perhaps better, a few drops of the spirit of hartshorn in a glass of water.

Costiveness and piles.

To prevent these, women in a pregnant state should make frequent use of the following electuary:

Mix together in a marble mortar, 2 ounces of the electuary of senna, 1-2 a drachm of powder of jalap, 2 drachms of cream of tartar, and 1-2 an oz. of syrup of roses. Half a tea-spoonful to be taken every night at bed-time, or oftener, as long as the above complaints continue.

Pregnant women should be particularly careful not to use aloes as a purgative, this medicine being very apt to increase the piles. The same caution is necessary with respect to Anderson's and Scott's pills, the basis of both which is aloes. If the piles should prove so very troublesome as to prevent the patient from sitting comfortably, leeches ought to be applied to the part; in all other cases, simple ablution with cold water, with the use of purgatives as above directed, will be sufficient.

Troublesome itchings.

Cooling laxatives are likewise proper in this place, also frequent ablution with cold or lukewarm water. If the itching does not speedily abate, a lotion is to be applied to the parts, twice a day, consisting of a drachm of sugar of lead, in a pint of distilled water.

Swelling of the feet and ankles.

Pregnant women are usually free from this complaint in the morning, but suffer a good deal from it towards night.

Prevention.

In the commencement it will be merely requisite for the patient to use a foot-stool when sitting so that her feet may never be in a hanging position for any length of time.

Remedy.

If there should be great distention, so as to give the sensation of almost bursting, slight scarifications ought to be made with the edge of a lancet; and flannels, wrung out of a hot fomentation of chamomile, are soon after to be applied. It is almost unnecessary to state, that this complaint invariably disappears at the period of delivery.

Cramp of the legs and thighs.

This complaint may be speedily relieved by rubbing the part affected with the following liniment: Mix together (by shaking in a phial,) laudanum, 1-2 an ounce, tincture of camphor, 1 oz. and sulphuric ether, 1-2 an oz.

Cramp in the stomach.

This is to be avoided by proper attention to diet, which should not be of a flatulent nature, or too hard of digestion. Attention is likewise to be paid to the state of the bowels.

When spasms actually occur, they are to be relieved by a few drops of spirit of hartshorn in a glass of water, or by the opiate draught recommended under the head HYSTERIC FITS.

Distension and cracking of the skin.

This is very apt to occur in the latter months of gestation, accompanied sometimes with considerable soreness. It is to be relieved by frequent friction with warm oil.

Distension of veins.

The veins of the legs, thighs, and belly, are apt to become enlarged in the latter stages of pregnancy. Although no bad consequence ever attends this, it will be necessary sometimes to relieve it by moderate bleeding, and by repeated small doses of infusion of senna, mixed with Epsom salts; at the same time using a spare diet. The distended vein may frequently be relieved by the application of a pretty tight bandage.

Incontinency of urine.

This very uncomfortable complaint is to be relieved by a frequent horizontal position, but cannot be entirely remedied but by delivery. Strict attention, however, ought to be paid to cleanliness, and much comfort will be felt by the use of a large sponge properly fastened.

Restlessness and want of sleep.

In this case, cooling laxative medicines, as the infusion of senna, with Epsom salts, ought frequently to be used. If relief be not soon obtained, small quantities of blood are to be taken from the patient. Opiates ought never to be used, as they tend only to increase the febrile state of the patient.

Convulsions.

When a female is disposed to this complaint from a plethoric habit, there will be great fulness and giddiness in the head, in the latter months of gestation; also drowsiness, with a sensation of weight in the forehead when she stoops, or bends forward, accompanied sometimes by imperfect vision, and the appearance of atoms floating before the eyes. In such a case, 10 or 12 oz. of blood ought to be taken from the arm, and the bowels are afterwards to be kept open by frequent and small doses of infusion of senna, mixed with Epsom salts, until the above symptoms entirely disappear. Wine, spirituous and malt liquors, and solid, or animal food, are likewise to be avoided.

When convulsions have occurred, and when there is reason to believe that they are owing to irritation, rather than plethora, it will likewise be necessary to bleed the patient in a small degree, both from the arm, and by the application of leeches to the temples. The bowels are also to be kept perfectly open, and a common clyster, containing from half a drachm to a drachm of laudanum, is to be administered. The warm-bath is likewise exceedingly useful; at the same time taking care to strengthen the habit as much as possible.

The milk fever.

This fever generally arises about the third or fourth day after delivery. The symptoms are pain and distension of the breasts, shooting frequently towards the arm-pit. Sometimes the breasts become hard, hot, and inflamed. It generally continues a day or two, and ends spontaneously by copious sweats, or a large quantity of pale urine.

Remedies.

If it should prove violent, especially in young women of a plethoric constitution, we should abate the inflammation by bleeding; this, however, is rarely necessary. But, in every constitution, the body must be kept open by gentle cooling laxatives, or clysters. The breasts should be often drawn either by the child, or if the mother does not design to give suck, by some proper person. If the breasts are hard, very turgid, or inflamed, emollient fomentations ought to be applied to them. The common poultice of bread and milk, with the addition of a little oil, may be used on this occasion; and warm milk, or a decoction of elder-flowers, for a fomentation.

Regimen.

The patient should use a thin, slender diet, consisting only of panada, or some other farinaceous substances. Her drink may be barley-water, milk and water, weak tea, or the like.

Inflamed breasts.

When the breasts tumefy, and begin to be uneasy, a few days after delivery, from the milk stagnating, gentle diaphoretics, and purgatives, are to be used, and camphorated spirit of wine is to be applied, or warm cloths, dipt in brandy are to be put to the arm pits. Should pain with inflammation come on, apply a poultice of bread, milk, and oil, and an emollient fomentation; and in case suppuration cannot be prevented, it must be treated accordingly. But, in general, it is much better to let the tumour break of itself, than to open it. The ulcer is afterwards to be treated according to the common rules for disorders of that kind.

If there be only a hardness in the breast, from coagulated milk, emollient cataplasms and fomentations are to be used, likewise fresh linseed oil, by way of liniment.

Sore nipples.

Chapped or sore nipples are very frequent with those who give suck. In this case the olive oil is a very proper application; or fresh cream spread upon fine linen; or a solution of gum arabic in water.

It is almost needless to observe, that whatever applications be made use of to the nipples, they ought always to be washed off before the child is permitted to suck.

Another remedy.

The following lotion for sore nipples has been found to succeed after the usual applications have failed. It has also been employed with complete success in cases of chapped lips, chilblains, and leprous affections of the skin. Its beneficial effects are attributed to the mild digestive property of the oil of juniper, which, by producing a healthy secretion of pus, in the place of an unhealthy irritating discharge (the cause of the obstinacy, and great sensibility of chaps and small ulcerations of the nipples,) speedily produces cicatrization. Attention should, of course, be paid to the stomach, bowels, and state of the system with respect to fever, relaxation, &c.

Take of essential oil of juniper, 6 drops, rectified spirit of wine, elder-flower water, of each 1-2 an ounce.

Dissolve the oil in the spirit, and then add the elder-flower water. To be filtered through paper, applied to the part affected, by means of lint, or soft old linen, two or three times a day.

Puerperal fever.

Puerperal fever commonly begins with a rigor, or chilliness, on the first, second, or third day after delivery; followed by a violent pain and soreness over the belly. There is much thirst; pain in the head, chiefly in the forehead, and parts about the eye-brows; a flushing in the face; anxiety; a hot dry skin; quick and weak pulse, though sometimes it will resist the finger pretty strongly; a shortness in breathing; high-coloured urine, and a suppression of the natural discharge. Sometimes a vomiting and purging attend from the first, but, in general, in the beginning, the belly is costive: however, when the disease proves fatal, a diarrhœa generally supervenes, and the stools at last become involuntary.

The cause of this fever has been commonly ascribed either to a suppression of the natural discharge, an inflammation in the womb, or a retention of the milk.

Remedies.

If the belly be costive, an emollient opening clyster is to be administered; and if stools, and an abatement of pain be not procured thereby, immediate recourse is to be had to cathartics, and repeated bleeding from the arm. Those to be recommended are, Epsom salts and infusion of senna, or castor-oil; either, in sufficient quantity.

After the intestinal canal is sufficiently cleared, and the pain abates, a gentle diaphoresis is to be encouraged by such medicines as neither bind the body, nor are heating. This intention is best answered by small doses of ipecacuanha, tartar emetic, or antimonial wine, combined with a few drops of laudanum, and given about once or twice in the course of the twenty-four hours. In the intermediate spaces of time, interpose saline draughts.

Regimen.

The patient's drink should consist of pure water with a toast in it; barley water, either by itself, or with the addition of a little nitre; whey made with rennet or vinegar; milk and water; lemonade; a slight infusion of malt; and mint or sage tea.

MANAGEMENT AND DISEASES OF CHILDREN.

The early management of youth has a more important influence on the health and happiness of man, than is generally imagined. As, at this period of our existence, the foundation is laid, either for irremediable debility, or for mental and bodily vigour. Infants, consequently, require constant care, and indefatigable personal attention.

Infant nursing.

A child, when it comes into the world, should be laid (for the first month) upon a thin mattrass, rather longer than itself, which the nurse may sometimes keep upon her lap, that the child may always lie straight, and only sit up as the nurse slants the mattrass. To set a child quite upright before the end of the first month, is hurtful. Afterwards, the nurse may begin to set it up and dance it by degrees: and it must be kept as dry as possible.

Friction.

The clothing should be very light, and not much longer than the child, that the legs may be got at with ease, in order to have them often rubbed in the day with a warm hand or flannel, and in particular the inside of them. Rubbing a child all over, takes off scurf, and makes the blood circulate.

Rubbing the ankle-bones and inside of the knees will strengthen those parts, and make the child stretch its knees and keep them flat.

Position.

A nurse ought to keep a child as little in her arms as possible, lest the legs should be cramped, and the toes turned inwards. Let her always keep the child's legs loose. The oftener the posture is changed the better.

It is injurious likewise to be laid always asleep on a person's knee. Her motions and conversation will disquiet him. During the first fortnight or three weeks he should be always laid on a bed, except when taken up to supply his wants, which will give him habits of cleanliness at a very early age.

He may very comfortably be laid upon a cushion, where he can be in no danger of falling, nor of any thing falling upon him. People often forget, and let the weight of their arms rest upon a child as he sits or lies upon their laps—and it crushes him to be continually in arms. Some one should sit by him to divert and cheer him if necessary, and to take him up instantly when he expresses the least dissatisfaction. Mothers and nurses should make it a strict rule, that the child should be in their own view, whatever they may be doing; or if they must go from home, let him and all the family, if necessary, be left to the care of a neighbour. Indeed, neighbours should in turns take charge of each other's little ones, when the parents go from home; as also in seeing them to school, and meeting and conducting them home.

Exercise.

By slow degrees, the infant should be accustomed to exercise, both within doors and in the open air; but he never should be moved about immediately after sucking or feeding: it will be apt to sicken him. Exercise should be given by carrying him about and gently dandling him in his mother or nurse's arms; but dancing him up and down on the knee is very fatiguing for a young child.

To prevent distortion.

Tossing a child about, and exercising it in the open air in fine weather, is of the greatest service. In cities, children are not be kept in hot rooms, but to have as much air as possible. Want of exercise is the cause of rickets, large heads, weak joints, a contracted breast, and diseased lungs, besides a numerous train of other evils.

Rendering children hardy.

Endeavour to harden the body, but without resorting to any violent means. A child is constitutionally weak and irritable to a high degree: hence we should endeavour to strengthen and diminish this irritability, in order to procure it the greatest happiness of life, a firm body, which may resist all the influence of air and weather. Such management is highly advantageous, as it will enable children, when adults, to support every species of fatigue and hardship.

The plan of hardening children may, however, be easily carried to excess. An extravagant attempt to strengthen youth, deprives them of their natural susceptibility of excitement, renders them insensible, and produces many bad effects: they acquire only a temporary energy, which decreases as they advance in years, and is attended with an early loss of their premature vigour. Parents, therefore, cannot be too seriously cautioned against such mischievous experiments. Among the practices alluded to, are the cold bath and violent bodily exercise ; both of which are often carried to extremes. People do not reflect, that the exertion of the bodily as well as the mental powers, ought not to be inordinate.

All attempts to render children hardy, must, therefore, be made by gradual steps. Nature admits of no sudden transitions. For instance, infants should by imperceptible degrees be inured to the cool, and then to the cold bath ; at the same time, attention must be paid to their previous management. If they have hitherto been accustomed to an effeminating treatment, and should be suddenly subjected to an opposite extreme, such a change would be attended with danger. When children have once been accustomed to a hardy system of education, such a plan must be strictly adhered to.

Cleanliness and bathing.

The child's skin is to be kept perfectly clean by washing its limbs morning and evening, and likewise its neck and ears ; beginning with warm water, till by degrees he will not only bear, but like to be washed with cold.

After he is a month old, if he has no cough, fever, nor eruption, the bath should be colder and colder, (if the season is mild) and gradually it may be used as it comes from the fountain. After carefully drying the whole body, head, and limbs, another dry soft cloth, a little warmed, should be used gently, to take all the damp from the wrinkles or fat parts that fold together. Then rub the limbs; but when the body is rubbed, take special care not to press upon the stomach or belly. On these parts the hand should move in a circle, because the bowels lie in that direction. If the skin is chafed, hair-powder is to be used. The utmost tenderness is necessary in drying the head, and no binding should be made close about it. Squeezing the head, or combing it roughly, may cause dreadful diseases, and even the loss of reason. A small soft brush, lightly applied, is safer than a comb. Clean cloths every morning and evening will tend greatly to a child's health and comfort.

Dress.

With regard to the child's dress in the day, let it be a shirt, a petticoat of fine flannel, two or three inches longer than the child's feet, with a dimity top (commonly called a *bodice-coat*,) to tie behind. Over this put a robe or frock, or whatever may be convenient, provided it is fastened behind, and not much longer than the child's feet, that his motions may be strictly observed.

Caps may be worn till the hair is sufficiently grown, but by no means till the child has got most of its teeth.

The dress for the night may be a shirt, a blanket to tie on, and a thin gown to tie over the blanket.

The act of dressing.

Some people in dressing an infant, seem in such haste as to toss him in a way that must fatigue and harass him. The most tender deliberation should be observed. In addition to this hurried dressing, his clothes are often so tight that he frets and roars. Pins should never be used in an infant's clothes; and every string should be so loosely tied that one might get two fingers between it and the part where it is fixed. Bandages round the head should be strictly forbidden. Many instances of idiotism, fits, and deformity, are owing to tight bandages.

Heat and cold.

Never allow the infant to be held opposite to open doors or windows. The air is good for him when he is in motion, and the weather is moderate ; but he should always have some covering besides that which he wears in the house, when taken out ; and he must not be laid on the cold ground, nor allowed to step on it, when he begins to use his feet. The extreme heat of a summer day should likewise be avoided. Excessive heat or cold will hurt him.

Infants are greatly hurt by keeping them too near the fire ; and often when they are oppressed with heat, a thoughtless woman takes them into the air with little defence against it. A great coat, with a loose hood and a deep cap fixed to the hood, would prevent many infants from much illness from this cause. Making the hood loose prevents the child's head from being pulled about, and the deep cap protects his shoulders if the coat should slip a little from them.

Food and drink.

The wisest maxim in treating infants, is to follow the simple dictates of nature : yet some people give them wine, spirits, spices, sugar, and many things that the stomach of many a grown up man or woman would reject. The first milk a baby can squeeze from his mother's breast is medicine and nourishment for him, and if she is too ill to bestow it, it would be more safe to let him sleep three or four hours to wait her recovery, than to give him any aliment. If he seems to crave it, mix two tea-spoonsful of milk, warm from the cow, with four tea-spoonsful of soft boiled water, and give him half a tea-spoonful at a time, a little warm—observing that his mouth cannot bear much heat ; at all times the utmost care will be necessary to avoid hurting his gums, when feeding him. His food should be cooled by little and little, in a saucer, and it should be given to him in a small spoon, only half filled, which will save his clothes from being dirtied, and keep his bosom dry. Let him swallow one little portion, before another is offered, and raise his head that it may pass the gullet easily. Never entice, nor press him to take more, if he once refuses it. He knows best when he has enough, and if he exceeds, by teasing, it may perhaps disorder his stomach, or train him to gluttony. By forcing his appetite he will be deprived of calm sleep, which is as necessary for his growth as food.

As soon as he can have his mother's milk, no other sustenance will be wanting, if she is a good nurse. If there should be the least doubt of her having milk enough, the child may have cow's milk mixed with two-thirds of soft boiled water, presented to his lips very frequently; but he should never be urged to accept it.

If the mother cannot suckle the child, get a wholesome cheerful woman, with young milk, who has been used to tend young children. After the first six months, broths, and innocent foods of any kind, may do as well as living wholly upon milk.

Asses' milk is lighter than cow's milk, and requires only one third part of water for an infant. Goat's milk is next best, and takes an equal quantity of water. If milk cannot be had, a tea-spoonful of the yolk of a fresh egg, well beaten, and mixed with five tea-spoonsful of soft boiled water, will supply the place of milk. A piece of the lean part of well fed veal, three inches square, and one inch in thickness, will make soup for a baby for two or three days. Only half the meat should be boiled at once, and that in a pint of soft water, till one-third of the water is consumed. Strain the soup, and set it to cool. When cold take off the scum, and pour the clear liquor, from the sediment. Warm a little for use as it is wanted. Any lean fresh meat will do: but veal or the flesh of young animals is best. If that cannot be had, a thin gruel made from rice, or fine pot barley, or shelled oats will answer the purpose.

It is improper and pernicious to keep infants continually at the breast; and it would be less hurtful, nay even judicious to let them cry for a few nights, rather than to fill them incessantly with milk, which readily turns sour on the stomach, weakens the digestive organs, obstructs the mesenteric glands, and ultimately generates scrofula and rickets. In the latter part of the first year, pure water may occasionally be given; and if this cannot be procured, a light and well fermented table-beer might be substituted. Those parents who accustom their children to drink water only, bestow on them a benefit, the value and importance of which will be sensibly felt through life. Many children, however, acquire a habit of drinking during their meals; it would be more conducive to digestion, if they were accustomed to drink only after having made a meal. This useful rule is too often neglected; it is certain that inundations of the stomach, during the mastication and maceration of food, not only vitiate digestion, but may be attended with other bad consequences. Cold drink, likewise, when brought in contact with the teeth, previously heated, may easily occasion cracks or chinks in these useful bones, and pave the way for their carious dissolution.

Early rising.

Rising early in the morning is good for all children, provided they wake of themselves, which they generally do; but they ought never to be waked out of their sleep. As soon as possible, however, they should be brought to regular sleeps in the day.

Walking.

Children, till they are two or three years old, must never be suffered to walk long enough at a time to be weary.

Sleep.

In laying a child to sleep, he should be laid upon the right side oftener than on the left; but twice in the twenty-four hours, at least, he should be changed to the left side. Laying him on his back when he is awake is enough of that posture, in which alone he can move his legs and arms with freedom. Place the cradle so that the light may come equally on both eyes, which will save him from a custom of squinting.

Infants cannot sleep too long: and it is a favourable symptom, when they enjoy a calm and long-continued rest of which they should by no means be deprived, as this is the greatest support granted to them by nature. A child lives comparatively much faster than an adult; its blood flows more rapidly; and every stimulus operates more powerfully. Sleep promotes a more calm and uniform circulation of the blood, and it facilitates assimilation of the nutriment received. The horizontal posture, likewise, is the most favourable to the growth and bodily development of the infant.

Duration of, and time for sleep.

Sleep ought to be in proportion to the age of the infant. After an uninterrupted rest of nine months in the womb, this salutary refreshment should continue to fill up the greater part of a child's existence. A continued watchfulness of twenty-four hours would prove destructive. After the age of six months, the periods of sleep, as well as other animal functions, may in some degree be regulated; yet, even then, a child should be suffered to sleep the whole night, and several hours both in the morning and afternoon. Mothers and nurses should endeavour to accustom infants from the time of their birth, to sleep in the night preferably to the day, and for this purpose they ought to remove all external impressions which may disturb their rest, such as noise, light, &c. but especially not to obey every call for taking them up, and giving food at improper times. After the second year of their age, they will not instinctively require to sleep in the forenoon, though after dinner it may be continued till the third and fourth year of life, if the child shows a particular inclination to repose; because till that age, the full half of its time may safely be allotted to sleep. From that period, however, it ought to be shortened for the space of one hour with every succeeding year; so that a child of seven years old may sleep about eight, and not exceeding nine hours; this proportion may be continued to the age of adolescence, and even manhood.

Awaking suddenly.

To awaken children from their sleep with a noise, or in an impetuous manner, is extremely injudicious and hurtful; nor is it proper to carry them from a dark room immediately into a glaring light, against a dazzling wall; for the sudden impression of light debilitates the organs of vision, and lays the foundation of weak eyes, from early infancy.

Restlessness at night.

Infants are sometimes very restless at night, and it is generally owing either to cramming them with a heavy supper, tight night clothes, or being over-heated by too many blankets. It may also proceed from putting him to sleep too early. He should be kept awake till the family are going to rest, and the house free from noise. Undressing and bathing will weary and dispose him for sleep, and the universal stillness will promote it. This habit and all others depend on attention at first. Accustom him to regular hours, and if he has a good sleep in the forenoon and afternoon, it will be easy to keep him brisk all the evening. It is right to offer him drink when a young infant; and more solid, though simple food, when he is going to bed, after he is two or three months old, but do not force him to receceive it; and never let any thing but the prescription of a physician in sickness, tempt the nurses to give him wine, spirits, or any drug to make him sleep. Milk and water, whey, or thin gruel, is the only fit liquor for little ones, even when they can run about. The more simple and light their diet and drink, the more they will thrive. Such food will keep the body regular, and they cannot be long well if that essential point is neglected.

The nursery.

A bed-room, or nursery, ought to be spacious and lofty, dry, airy, and not inhabited through the day. No servants, if possible, should be suffered to sleep in the same room, and no linen or washed clothes should ever be hung there to dry, as they contaminate the air in which so considerable a portion of infantine life must be spent. The consequences attending a vitiated atmosphere in such rooms, are various, and often fatal. Feather-beds should be banished from nurseries, as they are an unnatural and debilitating contrivance. The windows should never be opened at night, but left open the whole day, in fine clear weather. Lastly, the bedstead must not be placed two low on the floor; nor is it proper to let children sleep on a couch which is made without any elevation from the ground; because the most mephitic and pernicious stratum of air in an apartment, is that within one or two feet from the floor, whilst the most wholesome air is in the middle of the room.

Nurses.

Nurses ought never to conceal any accident which may unfortunately befal a child; neither ought they to give to, or withhold from a child, any article of food or medicine, contrary to the directions of the parents or guardians of the child. Above all things, it is highly criminal in a wet nurse, for selfish ends, to conceal a deficiency of milk, if that should happen to be the case, either from pregnancy, or a long course of nursing. Girls might be trained to the proper management of children, if a premium were given in free schools, work-houses, &c. to those that brought up the finest child to one year old.

External impressions.

All violent impressions on the senses and the bodies of children, ought to be carefully avoided. It is injurious to toss them about with rapidity in the arms. Loud crying, or shouting in their ears, discharging fire arms, presenting glittering objects to their view, as well as sudden and too great a degree of light are equally injurious. Thus infants are frequently stupified and affrighted; the brain is shaken in the most detrimental manner; and hence arise the most distressing consequences. On such occasions, we cannot bestow too much attention on the conduct of wet-nurses, or servants. A child ought to enjoy the most perfect rest and composure, if it be our wish to promote sound sleep, regular growth, and consequent prosperity. It is equally detrimental to both mind and body, when infants are continually carried about on the arm of the nurse, teased with loud soliloquies, prayers, or other mechanical prattling; and especially when they are incessantly provoked to display their anger or revenge. Such conduct is necessarily attended with pernicious effects, while it prevents the spontaneous expansion of infantine powers, blunts their senses, and is ultimately productive of nervous and muscular debility. The tender nerves of children experience a violent stimulus from impressions to which an adult may easily be habituated, or which do not sensibly affect him.

Amusements, &c.

The bodily education of boys and girls ought in every respect to be uniform. A great difference usually prevails in the education of both sexes during infancy. Parents, being too anxious for the accomplishment of girls, imagine that they must be kept under a certain restraint. Boys, in general, are not laced, but poor girls are compressed tight enough to suffocate them; because it is erroneously supposed, that this injudicious practice contributes to an elegant shape, though, ultimately, the contrary effect is obvious; as it is the surest way of making children round shouldered and deformed. Girls are, from their cradles, compelled to a more sedentary life; and, with this intention, dolls, and other play things, are early procured: yet boys are permitted to take more frequent exercise. Thus, girls are confined in their apartments, while boys amuse themselves in the open air. Such absurd constraints impede the free and progressive evolution of the different faculties inherent in the human mind.

Retention of the meconium.

A dark viscid matter, called meconium, is usually discharged from the bowels of infants, for two or three days after their birth. This is, in general, brought away by the purgative nature of the mother's milk. But when, either from the illness of the mother or the child, the meconium is retained in the bowels from not sucking, a tea-spoonful of castor oil ought to be given. If this does not operate quickly, and if the child is still very uneasy, a small clyster of thin gruel, olive oil, and a few grains of table salt, may be administered. A small pewter syringe, gently warmed, will be the readiest apparatus for giving the clyster. It should be kept in mind, that there are few cases where this treatment is necessary; nurses should, therefore, be prevented from drenching healthy new born infants with medicine and other rubbish. Let the doctor, or midwife, be the sole director in this case. The practice of stuffing a paste of sugar and butter down an infant's throat the instant that it is born, is beyond all expression a barbarous and monstrous custom, which cannot be too much reprobated by all well-meaning persons. Some foolish persons, in Ireland and Scotland, under the idea of ascertaining the child's strength, or of laying the *foundation of a good constitution*, pour spirits, (whiskey) down the new-born infant's throat. If suffocation or death take place, which must frequently happen, the administrators are undoubtedly guilty of infanticide, and deserve to be dealt with accordingly.

The yellow gum.

The yellow gum is known by a yellow tinge of the skin, with languor and a tendency to sleep. It is to be relieved by giving a tea-spoonful or more of castor oil, to clear the intestines. When the disease does not give way to this treatment, 8 drops of antimonial wine are to be given in a tea-spoonful of water so as to prove emetic. In about eight or ten hours, this is to be followed by 1-2 a grain of calomel, or 4 grains of rhubarb.

Vomiting.

When the food is vomited in an unaltered state, it is generally a sign of over-feeding: but when the vomiting is bilious, or when the food is partly digested, the diet ought to be changed, and the bowels opened by 1 grain of calomel given in sugar. This is to be followed by a tea-spoonful of castor oil on the following morning. If the vomiting should still continue, give a gentle emetic, and the calomel powder (containing 1 or 2 grains according to the age) soon after. If there be much irritation, apply a blister to the stomach; and, if possible, give a tea-spoonful of the saline medicine, in a state of effervescence, and containing 2 drops of laudanum.

Hiccups.

These generally arise from acidity in the stomach, and may be remedied by the administration of 8 grains of prepared chalk with 2 grains of powdered rhubarb, given in a little syrup or gruel. If very severe, the stomach is to be rubbed with a little soap liniment, or opodeldoc, to which a little laudanum has been added.

Griping and flatulency.

These are known by continual crying, restlessness, and drawing up of the legs. When attended by diarrhœa and green stools, it is to be relieved, in general, by the administration of a few grains of rhubarb and magnesia. If sour belchings, &c. still continue, it will be proper to give a tea-spoonful every quarter of an hour, of weak solution of tartar emetic, until the child vomits. After this, particularly if there be any purging, it will be proper to give a little rhubarb and magnesia again, and now and then a little chalk mixture.

Absorbent mixture.

If the pains are very great so as to make the child scream violently, two tea-spoonsful of the following mixture, with 5 or 6 drops of laudanum, may be given directly: Mix together, prepared chalk, 1 scruple, tincture of caraway seeds, 3 dr. compound spirit of lavender, 1 do. and of peppermint water, 2 oz.

As soon as there is diminution of pain, a purgative should be given, particularly if the bowels happen to be in a costive state. The best will be castor oil. The above mixture may afterwards be occasionally continued, but without the laudanum.

Anodyne plaister.

The late Dr. Clarke, of Burlington street, frequently ordered the following plaister to be applied over the bowels of infants, in case of griping and inflammatory excitement of the intestines: Take of compound plaister of laudanum, 1 1-2 oz. diachylon plaister, 2 dr. purified opium, 1 dr. oil of peppermint, 1 dr. camphor, 1 dr. Mix for a plaister, and spread on soft leather.

Diarrhœa.

This may, in general, if the stools are green, be relieved by a brisk purgative, of from 1 to 2 grains of calomel, with 4 or 5 of rhubarb, according to the age of the child. The *absorbent mixture* is then to be given as before directed.

Further remedies.

When the stools are very frequent and are either slimy or tinged with blood, it will be proper to give 5 grains of rhubarb every 6 hours, the food being beef tea, sago, isinglass in milk or calf's foot jelley, the body being wrapped in warm flannel. A small blister may likewise be applied to the belly; and a desert spoonful of the following tonic and astringent mixture is to be given every six hours: Mix together, tincture of rind, 1 dr. chalk mixture, 2 oz. laudanum, 12 drops, and cinnamon water, 1 oz.

Opiate clyster.

If the fluid stools are ejected with great force a clyster should be given, composed of half a tea-cupful of boiled starch, and 20 drops of laudanum. This may be repeated at an interval of 8 hours, if the symptoms do not abate.

Pot belly.

Take of scammony, in powder, 10 gr. socotrine aloes, 1 scruple, Spanish soap, 1 1-2 dr. essential oil of cloves, 3 drops, syrup of ginger, a sufficient quantity. Make 30 pills, and give 3 on going to bed.

Basilic powder.

Scammony forms a chief ingredient in the famous basilic powder, so serviceable for removing what is commonly termed pot-belly in children.

Take of scammony, in powder, calomel, antimonial powder, equal parts, 2 grains, cream of tartar, 10 grains, to be taken in currant jelly an hour after breakfast every other day.

This powder will often not only purge but vomit, which last effect will produce no harm.

Excoriations of the skin.

Children are apt to be chafed between the thighs, behind the ears, and in the wrinkles of the neck, from want of proper attention to cleanliness. In such cases it will be necessary to bathe the parts twice a day, (or every time that the child's things are changed) with a little warm milk and water; and to apply a puff with a little hair powder immediately afterwards, so as to keep the parts dry.—When *discharges* take place behind the ears, they must not be dried up too suddenly, as such a circumstance might produce a divertion to the brain. In such cases it will be always best to give frequent doses of castor oil, or calomel, every night, in the proportion of 1 grain to 3 grains of rhubarb.

Cutaneous eruptions.

No real danger attends these eruptions, which are generally known by the names of red-gum, nettle-rash, &c. All that is required to be done is to keep the bowels open by such means as are prescribed in the foregoing article, and to guard against cold, which might drive the eruption inwardly, and so produce internal inflammations of a critical nature. If the milk or food be considered the cause, the nurse, or diet, ought to be changed: and if sickness and vomiting should prevail, it will be proper to give the *absorbent mixture* mentioned under the head Griping and Flatulency.

The thrush.

This disease makes its appearance by little ulcerations in the mouth, tongue, &c. of a white colour, and sometimes of a yellow appearance. They are generally owing to acidities in the stomach, &c.

In this disorder nothing avails more than an emetic at first, and then a little magnesia and rhubarb, (if there is diarrhœa) with thin chicken-water as drink. Testaceous powders, or the *absorbent mixture* (*see* GRIPING and FLATULENCY,) will also be proper. If there is no looseness, it will be proper to give a grain or two of calomel, with 3 or 4 grains of rhubarb. The mouth and throat should at the same time be cleansed by gargles.

Syrup of black currants.

Take of the juice of black currants, strained, 1 pint, double refined sugar, 24 oz. Dissolve the sugar, and boil to make a syrup.

A tea-spoonful of this to be given to children in the thrush.

Falling down of the fundament.

This happens frequently to children who cry much, or who have had a diarrhœa, or from straining on going to stool. If it proceed from costiveness, give lenitive clysters. In case the gut be swelled or inflamed, foment with warm milk, or decoction of oak bark, or wash frequently with cold water. The protruded parts are now to be replaced by the finger, and supported by a truss or bandage. The internal use of tonics will be proper.

Dentition.

When children are about cutting their teeth, they slaver much, are feverish, hot, and uneasy; their gums swell, and are very painful; they are sometimes loose in the bowels, and at other times costive; now and then convulsions come on.

Leeches are often of use, applied behind the the ears; also blisters.

Scarifying the gums.

Instead of giving narcotics to children cutting their teeth, it is strenuously recommended to have the tumid gums divided by a lancet down to the tooth; an operation at once safe and unattended with pain. If done in time, by removing the cause of the complaint, all the symptoms will disappear of themselves. Instead of giving preparations of opium, it will be found, in the majority of cases, far better to administer calomel, in minute doses, as this medicine is well known to possess peculiar efficacy in promoting absorption in these parts. The body, if costive, should be kept regularly open, and if there should be looseness of the bowels, it should by no means be discouraged. Instead of coral, or any other hard body, let the child nibble at a piece of wax candle.

Convulsions.

Children are particularly liable to convulsions at the period of teething, small-pox, measles, and other eruptive diseases; sometimes, also, from external causes, such as strait clothes, bandages, &c. When they proceed from any of these, bathing the feet, or the whole body, in warm water, of 92 or 94 degrees, and administering a mild clyster, will almost immediately relieve them. To shorten the duration of the fit, cold water should be poured over the face and neck, whilst the rest of the body is in the bath.

The return of convulsions is to be prevented only by the removal of the cause of the existing irritation; but, in general, when the body is kept carefully open, there will be little cause to fear a return.

Inward fits.

In these fits the infant appears as if asleep, the eyelids however are not quite closed, but frequently twinkle and show the whites turned upwards. The muscles of the face are sometimes slightly distorted the mouth having the appearance of a laugh or smile. The breath is sometimes very quick, and at others stops for a time; whilst the eyelids and lips are pale and dark alternately. The infant startles on the least noise, and sighs deeply, or breaks wind. This relieves him for a little, but he soon relapses into a doze. Whenever the above-mentioned symptoms are observed, it will be right to awaken the infant, by stirring or otherwise, and to rub its back and belly well before the fire, until wind escapes. At the same time it will be proper to give half a tea-spoonful of drink or pap, containing 2 drops of oil of anise or caraways. As soon after as possible, a purgative of castor oil, or a grain or two of calomel (according to the age,) with 2 or 3 grains of rhubarb, is to be given, to empty the bowels of whatever crude matter may occasion the disorder.

The rickets.

This disorder affects the bones of children, and causes a considerable protuberance, incurvation, or distortion of them. It may arise from various causes, but more particularly when proper care has not been taken with children: when they have been too tightly swathed in some parts, and too loose in others; keeping them too long in one and the same position; and not keeping them clean and dry. Sometimes it may proceed from a lax habit, at others from costiveness.

It usually appears about the eighth or ninth month, and continues to the sixth or seventh year of the child's age. The head becomes large, and the fontanelle keeps long open; the countenance is full and florid; the joints knotty and distorted, especially about the wrists; less near the ankles. The ribs protuberate, and grow crooked; the belly swells; a cough and disorder of the lungs succeed; and there is, withal, a very early understanding, and the child moves but weakly, and waddles in walking.

Regimen, &c.

The regimen should be light and properly seasoned; the air dry and clear. Exercise and motion should be encouraged, and bandages, as well as instruments, contrived to keep the limbs in a proper situation; but we should take care that they be so formed as not to put the child to pain, or restrain it too much.

Cold sea-bathing is of infinite use; after which friction should be used, and the child placed between two blankets, so as to encourage perspiration. The back should be well rubbed with opodeldoc, or good old rum, every night.

A few grains of ipecacuanha or calomel may now and then be proper, and chalybeates are also very serviceable.

A decoction of Peruvian bark is also good with red wine: it is to be used with moderation in the forenoon and after dinner.

Distortion of the spine.

Dr. Weitch, an eminent physician of Berlin, has published, in Hufeland's journal, a simple remedy for weakness of the back-bone of infants, and which he considers capable of preventing distortion. This method consists, first, in frequent and close examination of the child's back-bone; and secondly, on the slightest trace of any distortion, to wash the same with brandy every morning and night, and to pay the strictest attention to the child's keeping a straight posture, both sleeping and waking; and if it can be bathed from time to time, it will be so much the better.

Jelly from the raspings of ivory.

The raspings of ivory impart to boiling water a very pleasant jelly, which has been found more easy of digestion and more nutritious than that of the hartshorn shavings or isinglass. Mixed with the jelly of the arrow root, in the proportion of one part to seven, it is much recommended for weakly and rickety children, and consumptive and emaciated invalids.

Ring worm and scald head.

It is well known that these disorders, which are in many respects similar, are contagious; therefore, no comb or hair-brush used by a child affected by them is to be used by another child either in a school or in the same family. Nor should the hat or cap of such a child be worn by any other.

Treatment.

Let the hair be removed carefully with a razor, dipped frequently in olive oil; and afterwards apply the following lotion by means of fine linen, and cover the whole or part of the head with it. Take of liquor of acetated lead, 2 drachms, distilled vinegar, 6 drachms, sulphuric æther, 2 drachms, rain water, 1 pint. Mix.

This lotion should be kept occasionally applied in the night as well as in the day, and an oil-silk cap should be fitted close to the heak, and worn continually.

Another mode of treatment.

The intractableness of most children, when attempted to be controlled or governed by the accustomed mode of treatment, proves, in most instances, a material obstacle in the way of curing this malignant disease; and the quickness with which the hair of the scalp grows in children, has hitherto, in most instances, rendered every effort ineffectual. It was a constant failure, under these inauspicious circumstances, that led Mr. Barlow, a medical practitioner in Lancashire, to adopt the subjoined lotion:—

Take of sulphate of potass, recently prepared, 3 drachms, Spanish white soap, 1 1-2 do. lime water, 7 1-2 oz. and spirit of wine, 2 drachms. Mix, by shaking well in a phial.

By bathing the affected head with this lotion a few times, morning and evening, and suffering the parts to dry without interruption, the scabs will decorticate and peel off from the scalp, and leave the parts underneath perfectly healed; without torturing the patient either by shaving the head, or cutting off the hair.

Ointment for the same.

Take of spermaceti ointment, 1 oz. tar ointment, 1 oz. powdered angustura bark, 3 drachms. Rub the whole well in a marble mortar, and apply to the parts affected.

Alterative medicines.

In six cases out of ten, this disease is aggravated by a scrofulous taint of the system; and when this is the case, the following alterative medicine accelerates the cure.

Take of oxide of zinc, precipitated sulphur of antimony, each 9 grains, resin of guaiacum, extract of bark, extract of hemlock, each 2 scruples. Mix, and form into 20 pills.

To children from six to ten years of age, give one pill night and morning; under six years, half a pill night and morning, mixed in raspberry jam.

Instead of the above, 1 grain of calomel may be given going to rest, and repeated every night; also the use of salt water externally and internally, as an alterative, has been found very useful.

In all cases the bowels ought to be kept open, and the diet should consist of wholesome and nutritive food; avoiding fish and salt meats. Cleanliness and occasional use of the warm bath will likewise be of service.

Hooping cough.

This convulsive cough is occasioned by a viscid matter which cannot be easily expectorated. The poor infant, in endeavouring to bring it up, strains violently, till he becomes almost suffocated and convulsed.

Remedies.

In this complaint, next to occasional vomiting the daily use of the warm bath is most useful. Bleeding may sometimes be useful, to prevent inflammation of the internal membranes, or cupping between the neck and shoulders. Gentle antimonial emetics should be given repeatedly, because the symptoms are always relieved when the child vomits.

Another.—Dissolve a scruple of salt of tartar in a pint of water, add ten grains of cochineal, finely powdered; sweeten this with sugar. Give an infant the fourth part of a table-spoonful four times a day. To a child two or three years old, half a spoonful; and to a child four years old or upwards, a spoonful. The relief will be immediate, and the cure, generally, in three or four days.

To the above may be added, as auxiliaries, a Burgundy pitch plaister on the pit of the stomach, a flannel waistcoat or shirt next to the skin, and a change of air when practicable. The diet should be light and easy of digestion, avoiding every thing of a fat and oily nature.

Another.—The following prescription has been found to succeed in several cases of hooping cough, which had resisted the use of other remedies:—Take of ipecacuanha wine, 2 drachms, syrup of white poppies, 2 oz. prussic acid, 15 drops. To be well mixed. The dose is from 1 to 2 tea-spoonsful three or four times a day, either alone, or in barley water. It should be well shaken each time previous to its being poured out.

Another.—By administering the prussic acid in the dose of one drop 3 times a day, in 2 table-spoonsful of almond emulsion, the most complete success has attended several cases of hooping cough, which had resisted the use of emetics, the hemlock, and other popular remedies.

The above two prescriptions must be made up by an apothecary.

Parisian remedy.

Take of sulphuret of potass, tincture of foxglove, each, 1 drachm, extract of liquorice root, 2 drachms, almond emulsion, 6 ounces, gum arabic powder, 3 drachms.—Mix. A dessert spoonful to be given to a child from 3 to 6 years of age; a table-spoonful from 6 to 10; two dessert-spoonsful from 10 to 15; and two dessert-spoonsful from 15 to 20; three times a day.

Another remedy.—The most efficacious external application that can be employed as a preventive of this most distressing complaint, is the plaister of the ammoniac gum, hemlock, and mercury, which is kept by most respectable chemists. It should be spread on thin soft leather.

Embrocation for hooping cough.

Take of emetic tartar, 2 drachms, boiling water, 2 oz. tincture of cantharides, 1 drachm, oil of wild thyme, 3 drachms. Mix. A dessert spoonful to be rubbed upon the chest every night and morning.

Vaccination, a remedy for the hooping cough.

Dr. Archer, an American physician, lately announced that the hooping cough is cured by vaccinating the patient in the second or third week after the commencement of the disease. This is an important discovery, and the experiment is, at least, harmless.

Regimen, &c.

A frequent change of air is exceedingly useful in hooping cough, particularly short voyages at sea; at the same time flannel is to be worn next the skin. Young children should lie with their heads and shoulders raised; and when the cough occurs, they ought to be placed on their feet and bent a little forward, to guard against suffocation. The diet should be light, and the drink warm and mucilaginous.

The croup.

This disease is peculiar to children, and generally fatal, if care is not taken in the commencement. It commonly approaches with the usual signs of a catarrh, but sometimes the peculiar symptoms occur at the first onset; namely, a hoarseness, with a shrill ringing sound both in speaking and coughing, as if the noise came from a brazen tube. At the same time there is a sense of pain about the larynx, and some difficulty of respiration, with a whizzing sound in inspiration, as if the passage of air was diminished: which is actually the case. The cough is generally dry, but if any thing is spit up, it is a purulent matter, sometimes resembling small portions of a membrane. There is also a frequent pulse, restlessness, and an uneasy sense of heat. The inside of the mouth is sometimes without inflammation, but frequently a redness, and even a swelling, exist. Sometimes there is an appearance of matter on them like that rejected by coughing.

Remedies.

As soon as possible a brisk emetic should be administered for the purpose of freeing the patient from the coagulated lymph which is already secreted. Topical bleeding, by means of leeches, should immediately succeed, and the discharge encouraged. As soon as it diminishes, a blister, so large as to cover the whole throat, should be applied, and suffered to lie on for thirty hours or longer. Then warm steam should be inhaled, and the bowels should be evacuated by calomel.

As soon as the emetic has operated sufficiently, opium may be administered, by which means the breathing will in general be soon relieved; but should it become more difficult in the course of a few hours, the emetic is to be again repeated, and after its operation the opium again employed. This practice is to be alternately used until such time as the patient is out of danger, which will in general be in the course of three or four days. The child should be kept nearly upright in bed.

Another remedy.—Administer two grains of calomel every four hours, until the decline of the disorder's severity. As an adjunct, apply an ointment to the breast, composed of 5 grains of emetic tartar, and 5 grains of powdered opium, to a drachm of spermaceti cerate, until eruptions are excited on the skin.

Suffocation prevented.—Dr. Reddelin, of Weismar, has communicated to the Royal Society at Gottingen the following successful treatment of croup, after the usual remedies had been tried without effect:—The patient was a female, aged 19, who, on the third day after being seized with the croup, was unable to swallow, had begun to rattle in the throat, and seemed approaching rapidly to dissolution. Dr. Reddelin insinuated, by means of a quill, a mixture of *Spanish snuff and marrocco* into her nostrils, and after repeating this mixture a second time, it excited sneezing and vomiting: this occasioned the discharge of two long membranous cylinders from the windpipe, upon which the rattling immediately ceased, and the patient was rescued from instantaneous suffocation. One of the tubes, when split open, measured nine French lines in breadth; they were quite white, and bore a strong extension, without injury to their fibrous texture.

Nervous croup.

In this disease, assafœtida, musk, camphor, opium, æther, castor, hemlock, and oxyde of lime, are to be used. Some cases have appeared to derive much benefit from the liberal use of milk. A French physician has used stimulant liniments to increase the irritability of the trachea, &c. he now employs them to take off the spasm of the same parts. The inhalation of vapour of warm water, medicated with æther, opium or hemlock. Pediluvia, or the foot-bath, rendered a little irritating by the addition of mustard, are also serviceable.

Bilious fever.

Children, until the age of six years, are liable to be attacked by bilious fever, which is gradually developed, by irregularity in the bowels, which are either too costive, or too much relaxed.

On its first appearance, the child becomes peevish and fretful, his lips are dry, his hands hot, accompanied by shortness of breath, pains in the head, and quickness of pulse, which beats from 110 to 120 in a minute; he shows an unwillingness to stir or speak, starts in his sleep, and has a loathing for food. The stools have often a mucous and slimy appearance; some children are affected with delirium, others dull and stupid, and many are for a time speechless. Several slight accessions of fever take place in the course of the day, during which the child is usually drowsy; in the intervals of these paroxysms he appears tolerably well, though, at times, unusually peevish.

These symptoms are more or less prevalent for 8 or 10 days, when suddenly a more violent paroxysm of fever will ensue, preceded by a shivering fit, and sometimes an incessant vomiting of bile. The pulse rises to 140; the cheeks are flushed, the child's drowsiness increases, and when awake, he resorts to picking at the skin of the nose, lips, and eyes, to a most painful degree.

This species of fever is mild at the commencement, slow in its progress, and very uncertain in its event. The desire for food is destroyed, and the child will neither take aliment or medicine. The stools are changed from their natural appearances, being sometimes black, and smelling like putrid mud; and at other times they are curdled, with shreds of coagulable lymph floating in a dark green fluid.

Treatment.

The best method of cure is to clear the stomach by a gentle emetic, and the bowels by purgatives; to lessen or remove the febrile symptoms, and then, if necessary, to have recourse to tonics, to restore the strength of the little sufferer.

The first thing, therefore, is to cleanse the stomach by a few grains of ipecacuanha, and soon afterwards to administer some active purgative. For restoring the healthy secretions of the bowels, nothing is so efficacious as small and often repeated doses of calomel and scammony, (3-4 of a grain of the former to 1 1-4 of the latter) followed up after some hours by a solution of Epsom salts in an infusion of senna, or by a dose of castor oil. When the stomach is very irritable, small quantities of chalk mixture, with a few drops of laudanum, are to be given alternately with the above-mentioned purgatives.

If the head is much affected, leeches should be applied to the temples, and if the stomach will not retain the medicine, from 3 to 6 leeches should be applied to the upper part of the belly, or right side; and after this a blister, if necessary. The warm bath will prove useful after the stomach and bowels are properly cleansed.

Tonic powder.

To obviate debility, when the fever is abated, the following tonic powder is recommended. Mix together 2 drachms powder of cascarilla, 24 grains rhubarb, and 1 scruple subcarbonate of iron. Divide this into 24 papers, one to be taken morning and evening.

Regimen and diet.

The children should likewise be sent to the country as soon as possible, and be allowed every reasonable amusement, to dissipate the peevishness which is an invariable consequence of a severe attack of this disease. The diet, for a time, should be light and nourishing; as jellies, isinglass and milk, veal broth and beef tea. The drink may be whey, and toast and water.

REMEDIES FOR POISONS.

Treatment to be adopted when poisoning has taken place.

The following are the means recommended by M. Orfila, in his elaborate work on poisons, to be employed in combating the effects produced by belladona, (deadly nightshade) stramonium, tobacco, digitalis, (fox-glove) meadow saffron, and the different kinds of hemlock, laurel, &c. &c.

Emetics.

If the poison have not occasioned copious vomiting, two or three grains of tartar emetic, and 20 or 30 of ipecacuanha, mixed in a small quantity of water, should be administered, to favour its immediate expulsion; and there is little danger of hastening absorption, if the quantity of water in which the emetic is mixed be not considerable. The action of vomiting should be aided by titillating the throat with a feather.

Purgatives and clysters.

If some time have elapsed since the poison was swallowed, and it is supposed to have passed into the intestinal canal, 2 or 3 grains of tartar emetic, and from an ounce to an ounce and a half, of Glauber salt, should be given; exhibiting at the same time purgative clysters.

Bleeding.

If after these means have been employed, symptoms of cerebral congestion remain, that is, if the vessels of the brain be overloaded, blood-letting from the jugular vein must be had recourse to, and repeated according to the temperature of the patient, and the benefit derived from it.

Acidulated drinks.

Acidulated drinks, particularly vinegar largely diluted with water, should be exhibited in small doses, and frequently repeated. If these acidulated liquids, however, be strong, or not exhibited until 20 or 30 hours after the poison has been taken, and inflammatory symptoms have come on, they prove hurtful; and this is also the case if they are exhibited before the expulsion of the poison, for the following reasons:—1. They do not favour vomiting; 2. They dissolve the active parts, and facilitate their absorption.

Demulcents.

If these means have allayed the nervous symptoms, the inflammatory, which almost always follow, must be combated by changing the acidulous fluids, for demulcent infusions and decoctions with milk, oils, &c.; and leeches may be applied upon the abdomen.

Tracheotomy, &c.

As the *Upas-tienté, Nux Vomica, St. Ignatius' bean, Upas antiar, Camphor, &c.* produce symptoms of asphyxia, or apparent cessation of life; in the treatment of cases of poisoning by them, it is necessary, besides employing emetics and other means for expelling the poison, to make an incision into the windpipe, and this is to be followed by an artificial inflation of the lungs with air. In the case of wounds by weapons, poisoned with any of these substances, the application of a ligature, and the deep cauterization of the wounds are the means recommended. We are of opinion, however, that more benefit would result from the complete excision of the wounded part, and then by the immediate application of cupping glasses with an exhausting syringe over the part.

Mushroom poisons.

With regard to the treatment of cases of poisoning by the fungi (*mushrooms*), M. Orfila details the results of a series of experiments, made with a view of ascertaining the virtue of the different substances which have been considered as antidotes, in such cases. *Vinegar* is useful when the poisonous fungus has been expelled by vomiting; but the reverse is the case if it still remain in the stomach, as this acid dissolves the poisonous principle, and thereby facilitates its absorption. *Common salt* (muriate of soda) acts in the same manner as vinegar; and therefore, requires to be employed under the same limitation. *Sulphuric ether*, as it also takes up the poisonous part of the fungi, should not be employed previous to the evacuation of the stomach; but afterwards it is of the greatest utility. *Emetics* and *emeto cathartics* are the most useful remedies in the cases under consideration. *Volatile alkali* is more hurtful than salutary; and oil, butter, and milk, are useless in this kind of poisoning, though beneficial in that produced by arsenic, corrosive sublimate, and other metallic salts.

Antidotes for vitriolic, nitric, muriatic, and oxalic acids.

Give immediately 1 ounce of calcined magnesia to a pint of cold water:—A glassful being swallowed every two minutes, so as to neutralize the acid and to excite vomiting. Soap and water, chalk and water, or potash and water, may likewise be used. Mucilaginous drinks are afterwards to be administered freely, such as linseed-tea, or gum arabic and water. Olive, almond, or linseed oil, will likewise be found very useful.

For external injuries from these acids.

When in anointing and protecting the coats of the stomach from corrosion, spirits of salt, aqua fortis, or oil of vitriol, have been spilt upon the skin, or clothes, immediately wash the part with large quantities of water, and as soon as they can be procured, add soap, potash, or chalk to the water. It will be proper likewise to tear off the clothes and wipe the skin, to free them as much as possible from the acid before washing with water.

Another for oxalic acid.

Give an emetic, if immediately at hand or within half an hour of swallowing the poison, and after this supply the patient with plentiful draughts of chalk and water, which is to be kept well stirred as administered. If the half hour has passed give the chalk and water alone, after which, let castor oil be administered both as a purgative and a clyster. In the latter case the chalk and water, in a midling warm state, may be combined with the castor oil.

For white arsenic, &c.

Give 5 or 6 table-spoonsful of ipecacuanha wine, 30 grains of white vitriol (sulphate of zinc) dissolved in water, or warm water with sugar, in large quantities to excite vomiting; to hasten the vomiting the throat may be tickled by means of a feather. Lime water, soap and water, in the proportion of 1-2 a lb. to 2 quarts, pearlash and water, and mucilaginous drinks, fat broths, milk, and oils, are to be administered afterwards. Violent pains in the bowels, succeeding the vomiting give room to suspect that some of the arsenic has passed that way; in which case a clyster, composed of a pint or more of warm water, with two ounces of Epsom or Glauber's salt dissolved in it, should be administered without delay, and followed by repeated clysters, of fat broth, or milk with oil, butter, or lard, added to it. Sulphuret of potash, (liver of sulphur) is also recommended when arsenic has been taken internally by design or mistake. A few scruples should be dissolved in half a pint or a pint of water, and administered a little at a time, as the patient can bear it.

For corrosive sublimate and other mercurial preparations.

When corrosive sublimate has been swallowed, emetics should be used as soon as possible, to evacuate it; at the same time, half a tea-spoonful of pearl or potashes dissolved in half a pint of warm water, should be given and repeated frequently, in order to render inert any portion of the poison which is not thrown up. The whites of 12 or 15 eggs may likewise be beaten up and mixed with a quart of cold water. A glassful of this is to be given every three minutes. Milk, oil, gum-water, and linseed tea, are likewise very useful.

For preparations of copper and brass;—as verdigris, &c.

After an emetic, give white of eggs, as for corrosive sublimate; mucilaginous drinks, with oil and milk, will likewise be proper.

For tartar emetic and other preparations of antimony.

Give warm water, or sugar and water; afterwards a grain of opium, or 15 drops of laudanum, every quarter of an hour, for two or three times: oil and milk will be afterwards useful.

For nitre and phosporus.

Give the same as for arsenic, with the exception of lime water and alkalies.

For swallowing pins or fish bones.

It is strongly recommended to those who have the misfortune to swallow a pin, or the bone of a fish, &c. to take 4 grains of tartar emetic, dissolved in warm water, and immediately afterwards the white of six eggs. The coagulated mass will not remain in the stomach more than two or three minutes, and the remedy has been known to remove no less than 24 pins at once.

Prevention.

Let us here hope, that all sensible persons will make it a point to discountenance the filthy and dangerous practice of putting pins and needles into the mouth. Women who hang out clothes are very apt to do this, to a great number at a time, and at the same time are obliged to bend their heads backwards; than which, nothing can be more productive of fatal consequences, if there should be the least spasm, or inclination to swallow the saliva; if a pin cusion is not at hand let the pins be stuck in the sleeve.

For sugar of lead, goulard extract, &c.

After an emetic, give large doses of Glauber's or Epsom salts, in warm water. Oils, milk, and linseed tea, will also be useful. If there is violent colic, give purgatives with oil and water gruel clysters.

For henbane, hemlock, nux vomica, deadly nightshade, tobacco, fox glove, and toad stools, or poisonous mushrooms

Give 4 or 5 gr. of tartar emetic in a glass of water; if this does not succeed, 4 grains of blue vitriol, or 30 grains of white vitriol, are to be given as an emetic. Do not give large quantities of water. After the poison has been ejected, give solution of common salt, vinegar, lemon-juice, or cream of tartar. But if these be given thirty hours after the poisoning, when inflammation comes on, they will prove hurtful: strong coffee, also, is useful. The patient must likewise be roused, and endeavour to walk about to prevent sleep. In France, the usual remedy for champignons or toad stools, is, after a brisk emetic, to give a drachm of sulphuric ether, in a glass or decoction of marsh mallows; with laxatives and clysters.

When any of the above vegetable poisons, or any other unknown matters have been swallowed, exciting sickness without pain of the stomach, or producing giddiness, drowsiness, or sleep, give instantly one table-spoonful of flour of mustard, with 40 grains of ipecacuanha powder in water, and repeat the mustard alone in copious draughts of warm water, constantly, until vomiting takes place. If the patient becomes so insensible as not to be easily roused, give the mustard in vinegar instead of water, and rub and shake the body actively and incessantly.

To distinguish mushrooms from toad stools.

Those which grow in marshy shaded places and in thick forests where the sun has no access, are in general to be regarded as possessing dangerous qualities; their substance is softer, moister, and more porous than that of mushrooms used for the table. They have likewise a more disagreeable and dirty looking appearance. Those which have a dusky hue, and change colour when cut; or which have gaudy, or many very distant colours, particularly if they have been originally covered by skin or envelope; or which exhale a strong and unpleasant odour; ought not to be eaten.

Those which have short bulbous stalks, or fragments of skin adhering to the surface, or which grow rapidly and corrupt quickly, should also be rejected. It has been generally supposed that poisonous mushrooms lose their deleterious qualities, but this is a rule to which there are many exceptions, and which ought therefore to be very cautiously admitted.

Destruction of poisonous plants.

Poisonous vegetables abound every where, and prove often fatal to the ignorant and unwary. This, indeed, is chiefly owing to carelessness. *Children ought early to be caution ed against eating any kind of fruit, roots, or berries, which they do not know;* and all poisonous plants to which they can have access, ought as far as possible, to be destroyed.

Poisonous plants have no doubt their uses, and they ought to be propagated in proper places; but as they prove often destructive to cattle, they should be rooted out of all pasture grounds. They ought likewise, for the safety of the human species, to be destroyed in the neighbourhood of all towns and villages; which, indeed, are the places where they most commonly abound.

For opium and laudanum.

In the case of *opium* or *laudanum* being taken in considerable quantity, vomiting should, if possible, be excited by giving a brisk emetic; and if the power of swallowing be lost, the emetic should be thrown into the stomach by means of a flexible tube and funnel, or syringe. But in the latter case, instead of using white vitriol, we should recommend a table spoonful of antimonial wine, 4 or 5 of ipecacuanha wine, 2 or 3 grains of emetic tartar dissolved in 1-2 a gill of water, or 30 or 40 grains of ipecacuanha in powder, to be employed; because these, though they should fail to produce vomiting, will serve to counteract the stupifying and noxious effect of the opium, by making it operate by sweating,—to promote which, the feet and legs should be bathed in hot water, or wrapped in flannels well wrung out of the same. In cases of a robust and plethoric habit, and where the brain appears to suffer, it will be proper to open the jugular vein.

Treatment by cold affusion.

From among several instances of the efficacy of the affusion of cold water, as related in the London Medical Repository, by Mr. Wray, surgeon, we select the following:

"I was called in Jan. 1821, to Mrs. E. who had half an hour before taken two ounces of laudanum. I found her in a state of profound stupor. Her pulse was much quicker than natural—her pupils were dilated, and no internal remedies could be administered. I had recourse to cold affusion, which produced the most decided benefit. A large bucketful of cold spring water was brought into the room, and a quart basinful was forcibly thrown on the head and chest. It roused her on the first application, but immediately afterwards she relapsed into the same state of stupor. By resorting repeatedly to the same means, in about ten minutes I had the satisfaction of hearing her speak. An emetic was then administered, which operated freely. Vinegar and water were given afterwards, and on the least tendency to drowsiness the cold affusion was repeated. I had the gratification the following day of seeing this lady perfectly restored."

Mr. Wray has found cold affusion decidedly efficacious in cases of extreme intoxication from spirituous liquors.

For cantharides, or Spanish flies.

Spanish flies, if taken even in but small quantity, will readily bring on an inflammation of the stomach or bowels, that may end in death. As we are not acquainted with any thing that when taken into the stomach, can deprive these of their acrid quality, our attention should be directed to evacuate them as speedily as possible by vomiting, and afterwards make the patient swallow a quantity of oil, milk, water gruel, or thick milk porridge, or something of the same kind, which will serve to envelope the flies that may still remain, and thereby protect the stomach and bowels from their acrimony.

Clysters of the above may likewise be used, to answer the same purpose in the lower intestines, and oil should be injected into the bladder which is peculiarly liable to inflammation from the internal use of Spanish flies. As an internal medicine, and as a clyster, castor oil with a few drops of laudanum, may be frequently administered.

For potash, soda, ammonia, and lime.

After an emetic, or a draught of oil, give vinegar and lemon juice, a spoonful or two in a glass of water very frequently. Oil and warm water will likewise be exceedingly useful.

For inebriation.

When men are reduced to this degraded state by the inordinate use of fermented or other spirituous liquors, they may be restored to comparative ease, by administering a teaspoonful of spirits of hartshorn, in a glass of water. Smelling the spirits dissipates the fumes arising from the same cause.

To dispel intoxication.

Take a wine-glassful of camphor mixture, which may be bought ready prepared at any chemist's. See camphor mixture, under the head *useful domestic medicines.*

For prussic acid.

This acid, either in its artificial state as a drug, or in natural combinations, as existing in bitter almonds, peach blossoms, laurel leaves, and the kernels of apricots, is well known to be a most active poison; the antidotes to which are alkaline salts and other stimulant medicines. When therefore, by the improper use of the acid itself, of bitter almond water, or laurel water, there is reason to suppose that poison has taken place, it will be proper to force down the throat 2 or 3 drachms of spirit of hartshorn, mixed with nearly half a pint of water.

For the poison which sometimes exists in eels, muscles, lobsters, and oysters.

When there is cause to suppose that poison has taken place from the deleterious qualities which sometimes, though rarely exist in the above mentioned and other species of fish, it will be proper to administer an emetic of 30 grains of white vitriol, as soon as possible; after which give from an ounce to two ounces of castor oil, and then copious draughts of milk and other diluent liquors, both by the mouth and in the form of clyster. Vinegar likewise will be proper, but in that case no milk should be given. The warm bath may be used, and the patient should be wrapt in flannel to excite perspiration.

BITES AND STINGS OF NOXIOUS ANIMALS, &c.

To prevent absorption of the poison of serpents.

The most effectual means of securing the patient from future bad consequences, is the excision of the part. Where this is not practicable, it is to be washed with a solution of pure potass, volatile alkali, or the *spiritus ammoniæ succinatus.* The wound ought likewise to be touched by a pencil of pure potass.

The long-continued affusion of cold water has been recommended. The warm liver of a fowl is now applied in the East Indies; also oily and unctuous applications, and the firing of gunpowder upon the wounded part; the application of a poultice of vinegar and vine-ashes has been successfully used. Also a poultice of quick lime with oil and honey. The fresh juice of the plantain is also by some considered an excellent antidote.

By ligature.

In South America, where the most venomous serpents abound, a very tight ligature, made instantly after the bite, between the part bitten and the trunk of the body, will prevent immediate danger, and allow time for proper means of remedy, either by excision of the whole joint, just above the ligature, or by topical applications upon the part bitten.

For instance, if the bite should be upon the end of the finger, a tight ligature of small cord should immediately be made beyond the next joint of the finger.

If the bite is on any part of the hand, the ligature should be made above the wrist by means of a garter or cord, lapped several times round the arm, and rendered as tight as possible by a small stick thrust betwixt the folds of the cord or gartar, and twisted round very hard, to prevent the circulation of the blood betwixt the part bitten and the other part of the body.

Treatment after absorption of the poison.

Madeira wine is the internal remedy most commonly used by Europeans in the Carnatic, and numerous instances are produced of persons not dying who had recourse to it. Emetics and powerful sudorifics are likewise resorted to, with advantage, in all European countries.

Spirit of ammonia.

Dr. Leslie relates a case in which ammonia was successful in preventing the effects of the bite of an adder. Travelling in the north of England, he stopped to give assistance to a poor man, who, having laid down on the grass to sleep, had been bitten. From experience of the beneficial effects of ammonia in India, in cases of the bites of different snakes, Dr. Leslie procured some spirit of hartshorn, and gave about a drachm of it, mixed with about half an ounce of gin and a little water. The effect was very sudden. In ten or fifteen minutes, the patient's eyes became brighter, his pulse fuller and stronger and his countenance altogether more cheerful; and by a repetition of the same remedy, in about the space of an hour and a half, he appeared perfectly recovered. Another dose was left to be taken at ten o'clock at night, and in the morning he said he was quite well, except a little numbness and weakness of the head; the day after, he returned to his work.

In the second volume of the Asiatic Researches, six cases are related, in which the volatile alkali has been successful. They were selected from a number which had come to the author's knowledge, who adds, "that he never knew an instance of volatile alkali failing in its effects, where the patient has been able to swallow it. He at the same time says, "that it does not act so much as a specific in destroying the quality of the poison, as by counteracting the effect on the system, by stimulating the fibres, and preserving that irritability which it tends to destroy." Dr. Temple also recommends the caustic volatile alkali, or *spiritus ammoniæ succinatus*, to be administered every five minutes; but in most cases the following will be found to be the best mode of administration.

Ammoniacal mixture.

Make a mixture of four ounces of almond emulsion and two drachms of water of ammonia; let the patient take two large tablespoonsful every hour.

Another mixture.—Mix together four ounces of camphor mixture and two drachms of the *spiritus ammoniæ succinatus.* Two tablespoonsful to be given every hour.

Effects of the other alkalies on the venom of serpents.

The excellence of alkaline salts, as antidotes to the venom of serpents, is evinced by the following communication from Dr. Brickell of Savannah.

"A person bit by a large *mockison snake*, was in dreadful torture, and so swelled as to be ready to burst. I gave him plenty of ley of wood-ashes with water to drink, and kept the bite, which was on his foot, constantly wet, by applying a solution of ley made caustic by quick lime.

"I was led to this by a chemical examination of the poison of the *crotalus horridus*, which shewed an acid to be one of its constituent parts.

"On putting a slip of litmus paper into the mouth of a rattlesnake, five feet long, and disabled by blows of a stick applied to the back, and then pressing the head, by placing the foot on it, the poison squirted out to the distance of some feet.

"The litmus-paper had its blue *entirely discharged*, and became white. A light band of red was to be seen between the part of the paper touched and untouched by the poison. By dipping it when dry, in a solution of fixed alkali (pot-ash ley,) the former blue colour was restored."

Carnatic snake pills.

Take of white arsenic, root of *velli nari*, roots of *neri visham*, kernels of *nervalam*, pepper and quicksilver, each, an equal quantity. The quicksilver is to be rubbed with the juice of the wild cotton (the *Asclepias gigantea*,) till the globules become invisible. The arsenic being first levigated, and the other ingredients reduced to a powder, are then added, and the whole is beaten up together, with the juice of the wild cotton, to a consistence fit to be divided into pills of six grains each. If a person be bitten by a *Copra de capello*, mix one of the pills with a little warm water, and give it to the patient. After waiting a quarter of an hour, should the symptoms of infection increase, give two pills more: should these not sufficiently counteract the poison, another pill must be given an hour after. This is generally found sufficient. For the bite of all kind of vipers, the Hindoos give two pills; and if the poison is not counteracted within half an hour, they give two pills more; but if the life of the patient should appear to be in danger, four pills may be given. An incision is at the same time often made on the top of the head, and a pill pulverized is rubbed on the wound.

For the bite of all other less poisonous snakes, one pill every morning for three days is sufficient. The patient ought to observe a regimen for six days, eating only *congee*, (rice water,) and rice, or milk and rice. He should abstain from salt, and his drink may be warm water. Sleep is to be prevented for the first twenty-five hours.

The pills should be powdered and mixed with water, with a view to hasten their operation; a circumstance of material importance in cases of the bite of venomous snakes, where the progress of the poison is sometimes incredibly rapid. These pills are also given to persons bit by mad dogs.

West Indian remedy for the bite of serpents.

The bite of serpents, as well as the sting of scorpions, is cured in South America, and the West Indies, (at St. Lucia,) by collecting grains of gombre perfumed with musk, which are to be dried and reduced to an impalpable powder, sifted and put into a bottle, so as to fill it one-third, and rum is to be added to the amount of the other two-thirds. A wine-glassful is to be administered soon after the bite, taking care to shake the bottle previously. Let the part be scarified, and then rubbed slightly with a cloth soaked in the liquid, cover it up with the same, and keep it moist by adding more of the mixture. In half an hour administer a second glass internally; but should vomiting come on, in consequence of the poison affecting the stomach, let the patient continue drinking the mixture until the vomiting ceases.

Spanish remedy for hydrophobia, and the bites of vipers.

The following remedy is a composition of the sea holly (eryngium campestre,) vipers bugloss (echium vulgare,) madwort (alyssum spinosum,) and Cretan balm (melissa cretica) by Canvanilles named nepeta marifolia. These plants are to be gathered when beginning to run to seed, and dried in the shade, till all their humidity is evaporated. Then let each be separately powdered, passed through a hair sieve mixed in equal parts, and put away in well corked bottles. None of the roots are to be employed, except those of the sea holly.

The common dose of this powder, for a man, is one scruple; for a dog, one drachm;—the vehicle used being wine or water. No particular diet need be observed; only the powder must be taken morning and evening for nine days successively.

It is indispensably necessary that this remedy be administered immediately after the infliction of the wound. Its efficacy has been fully established in certain districts of Spain, by the experience of ages in the cure of persons bitten by vipers. Canvanilles tried its effect in bites of mad dogs with signal success.

For bites and stings of small reptiles and insects.

The local pain produced by the bites and stings of reptiles and insects, in general, is greatly relieved by the following application.

Make a lotion of five ounces of distilled water, and one ounce of tincture of opium. To be applied immediately.

Another.—Mix 5 1-2 ounces of distilled water, and 1-2 an ounce of water of ammonia. Wash the part repeatedly with this lotion until the pain abates.

For the stings of wasps, &c.

The following mode, which was lately successfully adopted in completely curing the sting of bees, wasps, and hornets, may prove of essential service to some of our fellow creatures, as well as to the brute creation:

A horse, the property of Mr. Lawton, whilst playing about in a meadow, disturbed a nest of wasps, which immediately covered his head and body in myriads; the poor tortured animal ran about in frantic manner, for some time endeavouring to dislodge these venomous creatures, but in vain, and when at last quite spent with fatigue and agony, he thrust his head into the thickest part of the hedge, being quite overcome, he fell down in a dying state; the owner, coming accidentally into the field, saw the state of his favourite horse, and immediately procured a quarter of a pound of Prussian blue, which he dissolved in a sufficient quantity of soft water, and washed the horse over with this mixture; in the space of a quarter of an hour, the animal began to revive, and in one hour's time it was completely restored, and the next day was enabled to undertake a journey.

Prussian blue is an excellent remedy, for the stings of insects in general, and is always attended with uniform success.

Another.—Sweet oil applied immediately, cures the sting of wasps or bees; and if the sting is left in the wound, it should, if possible, be extracted with hair pincers.

Another.—Take an onion, and cut it through the middle, then put a quantity of salt upon it, and lay it upon the place for an hour or more. Common salt alone, moistened with a little water, applied to the part, will give immediate ease.

For the sting of a gnat.

Olive oil, unsalted butter, or fresh hog's lard, if timely rubbed on the wound;—or a small but equal portion of Venice turpentine and sweet oil, mixed together, and applied to the part, will effectually remove the pain in the space of six hours.

Another.—Mix some powdered chalk with a little water, to the consistency of a paste, which rub well into the wound, given either by the sting of a gnat, a wasp, or bee. An immediate cure will be effected.

For the bite of mosquitoes.

These troublesome insects invariably torment Europeans in the West Indies, and other warm climates. Their bite produces small tumours, which inflame and itch to such a degree as to cause a continual scratching, and often very troublesome ulcerations. To allay this, it will be necessary frequently to bathe the parts with hartshorn, solution of sugar of lead, or with diluted laudanum. At the same time, to cool the body by an occasional dose of Epsom salts. When pustules arise, it will be proper to open them by means of a lancet.

Prevention.

Persons liable to the bites of mosquitoes, should sleep under the cover of a lawn, gauze, or leno net, and in the day time should wear gloves and long linen trowsers.

On swallowing a wasp.

Instantly put into the mouth a tea-spoonful of common salt. This will, instantaneously, not only kill the wasp, but at the same time heal the sting.

To dislodge ear-wigs from the ear.

Ear-wigs may be destroyed by dropping into the ear a little olive-oil, sweet-oil, or oil of almonds: or, it may be enticed out alive, by applying a piece of apple (for which that insect has a peculiar fondness) on the outside of the ear.

To extract briars or thorns.

If a thorn has run into the leg and the flesh close over it, apply a small piece of shoemaker's wax, and a poultice over that; let them remain for twelve hours, or till the wax draws out the end of the thorn, which seldom requires so long a time to be extracted.

For the sting of nettles.

The juice of tobacco-leaves, unmanufactured, is a remedy for the sting of nettles: care must be taken, however, that the skin is not broken; as in that case the effects would be the same as if the patient had swallowed the juice, viz. vertigo, fainting, and vomiting,

To prevent absorption of the poison of bites of rabid animals.

The first step should be the application of a tight ligature above the wound; secondly, the speedy and complete excision, of the wounded part, in situations where such practice is admissible; and thirdly, the long-continued affusion of an alkaline solution, as pearlash water, over the excised parts. The wound should afterwards be dressed with the ointment of Spanish-flies, or any other stimulating ointment, in order that a discharge may be kept up for a considerable length of time.

When, from the timidity of the patient, or from the wounded part being so situated as to render extirpation inadmissible, other means are to be adopted; ablution with a very dilute solution of pure potass, or the application of a pencil of lunar caustic (nitrate of silver) or pure caustic potass, are most likely to be attended with success. Nitric acid is applied by some as the safest means of preventing the evil consequences arising from the bite of rabid animals, and destroying the poison, as it not only acts upon the parts contiguous to the bite, but decomposes any saliva, which may have been infused into the wound. It is, however, apt to spread itself too far over the surrounding surface.

To prevent hydrophobia.

Persons who suffer this dreadful misfortune, should immediately apply to the first spring, brook, pool, or ditch, which can be found, and of all remedies there is fortunately none so immediately within reach and command. Even if the injury be received at any distance from any town or village, water is always near, and the part may be easily cleansed. If the accident happen in the neighbourhood of any house, the water may be introduced with more force by pouring it from a jug with a spout, a tea-kettle, or more forcibly still by a pump. A syringe, if at hand, may also be found a very useful instrument.

Dr. Mease, of Philadelphia, in treating on the prevention of this disease, states, "In preference to caustics, I have always advised the plan first suggested by the late Dr. Haygarth, of Chester, in England, viz.—the long continued stream of water, on the wounded part, from the mouth of a tea-kettle; a powerful argument in favour of which, is, that as the poison exists in a watery form, water must be its most proper solvent. I have also advised the wound to be kept open some time, as an additional security. If the wound be small, it ought to be dilated. If the knife should enter the wound inflicted by the teeth of the dog, re-commence the operation with a *clean* knife; for if the operation be continued with the contaminated knife, it will probably prove unavailing, by the sound parts being inoculated with the canine virus. To inattention to this important advice may be attributed the failure of the complete extirpation of the wounded part, in preventing hydrophobia."

Another mode.—The moment any person has been bit by a dog (whether mad or not) the wound should be dressed with salt and water, or a pickle made of vinegar and salt; the dog should not be killed till it is fully ascertained that it is mad. In which case, send immediately for medical aid, and till it arrive, use friction with tepid oil, which will serve to expel the poison, or to destroy its activity.—Any medicine that may be afterwards taken, should be continued for at least forty days, during which time the patient should abstain from flesh and all salted and high-seasoned provisions. He must avoid strong liquors, and live mostly upon a light and rather spare diet.

By muriate of antimony.

Caustics, if applied properly, and at an early period, are sufficient to insure the safety of persons bitten by rabid animals. A young man, bitten by a mad dog, with which he had struggled for a long time, had no less than 25 wounds, of all dimensions, two of which, by the tearing of the skin, were very large. The punctured wounds were made larger; and where the torn skin formed flaps, it was removed. The liquid caustic (muriate of antimony) in this instance was applied, and thus the wounds were cauterized. The eschars became moist, and separated in a short time, and the wounds healed like other wounds made by cauterization.

Treatment after absorption of the hydrophobic poison.

If there is reason to supppose that the hydrophobic poison has been absorbed, stimulants, such as wine, spirits, and aromatic substances and bark, are to be administered to the patient; also the citric and tartaric acids, according to the following directions:—Mix together a scruple of citric acid, 8 grains of the powder of capsicum, and as much of the confection of roses as will make the whole into a paste. This is to be taken in a pint tumbler of good punch.

Another remedy.—Make a bolus of 6 grains of capsicum powder, 1 scruple of tartaric acid, and as much confection of roses as will be sufficient. Let one of these be swallowed by the patient, every second, third, or fourth hour, as the occasion may be supposed to require. With the administration of the above, use the warm-bath, also external friction with oil, and a copious use of the same, internally.

Another.—Profuse perspiration by means of ipecacuanha is often of very great use in cases of hydrophobia. Aromatics and tonics are likewise proper. Mix together 2 scruples of powder of bark, and half a scruple of compound powder of cinnamon. This powder is to be taken every second or third hour, in a glass of good old port wine. The *Carnatic, or Tanjore Snake pills*, have also been much employed in cases of hydrophobia, and with success.

Efficacy of salt water.

In man or animals attacked with this terrible disease, small whitish pustules appear near the ligament of the tongue, which open spontaneously on the third day after the bite; at this crisis, the first symptoms of the real disorder become manifest. By lancing these pustules nine days after the bite, by extracting all the humour, and washing the mouth well with salt water, the fatal effects are prevented. Several individuals have been saved by this process.

In the year 1759, a person, *pro bono publico*, caused a stage to be erected at Charing-cross, London, and in the presence of many thousand persons, permitted himself to be bit by a mad dog for the purpose of exemplifying the cure, which simply consisted in rubbing into the wound some common salt, which he described as a specific for this frequently unfortunate calamity.

Oxy-muriatic acid.

At Pavia, many trials have been made which prove the efficacy of chlorine, or *oxygenated muriatic acid*, in subduing hydrophobia. Dr. Prevesali prescribed with success, (where the symptoms were advanced,) in a liquid form, from a drachm to a drachm and a half daily, in citron water, or syrup of citron.

Decoction of broom tops.

Dr. Muller, of Vienna, has lately published, in the "*Gazette de Sante*," a new mode of treating this formidable disease, which was communicated to him by M. Marochetti, a surgeon of Moscow. This surgeon during his residence at Ukrane, in the year 1813, attended fifteen persons who had been bit by a mad dog. While he was making the necessary preparations for cauterizing the wounds, some old men requested him to treat the unfortunate people according to the directions of a peasant in the neighbourhood, who had obtained great reputation for the cure of hydrophobia. To this M. Marochetti assented. He made choice of a lady, sixteen years of age, whom he had treated till then by the customary means. The peasant gave to the fourteen patients placed under his care *a strong decoction of the tops of the flowers of the yellow broom* (a pint and a half a day.) He examined twice a day the under part of the tongue, where he had generally discovered little pimples, containing the hydrophobic poison: these pimples really followed, and were observed by M. Marochetti himself. As they formed, the peasant opened them and cauterized the parts with a red-hot needle; after which, the patients gargled with the decoction above-mentioned. The result of this treatment was, that the fourteen patients returned cured, having only drank the decoction six weeks.

About five years afterwards, M. Marochetti had an opportunity of giving this treatment another trial. Twenty-six persons, who had been bit by a mad dog, were put under his care, viz.—nine men, eleven women, and six children; he ordered them to be given, as soon as possible, the decoction of broom tops, and upon an attentive examination of their tongues, he discovered pimples on five men, three children, and all the women. The seven who were free from pimples took the decoction of broom for six weeks with success.

The time in which these pimples appear, is generally between the third and ninth day after the bite. If they are not opened before twenty-four hours after their appearance, the venom is absorbed, and the patient is lost.

On this account the tongue should be examined immediately after the bite, and this examination continued for six weeks, drinking daily a pound and a half of the decoction of broom tops, or a drachm of the fresh powdered plant, four times a day. If during this time, the pimples do not form themselves, the disease ought not to be dreaded, but as soon as they do appear, they must be opened and cauterized immediately, and the gargle (the decoction mentioned above) used frequently.

Efficacy of the herb skull-cap.

The herb called scull-cap, (*scutellaria tacteriflora*) according to Dr. Spalding, of New York, is an infallible remedy for hydrophobia. It may be taken at all times, whether the individual be fresh bitten, or if the symptoms have already appeared. In the latter case, the efficacy of this herb will be equally beneficial. Dr. Spalding produces positive testimony, confirmed by a great number of facts, that the number of human beings restored to health by this herb, amounts to 850.

Dubernard's mode of treatment.

M. Dubernard, a French surgeon, relates the successful treatment of three persons bitten by mad dogs in the following terms: "The wounds were diluted and well washed with a strong solution of sea-salt, and afterwards seared with a red hot iron. Immediately after, a blistering plaister was applied to each of the wounds. The suppuration was copious, and kept up for a month by gentle epispastics. After the first dressing, the patient was put upon the use of volatile alkali. This he took three times a day, for a fortnight, to the amount of fifteen drops in two ounces of water. After this the dose was altered to twenty drops twice a day, morning and night, and continued until the thirty-fourth day from the accident. It was then discontinued, having never been intermitted but twice during the whole time, and that in the morning, for the purpose of taking mercurial pills. On the forty-fourth day from the bite, the patient went about his usual business."

Another person, bitten by the same dog, and not treated according to M. Dubernard's plan, died on the 26th day, with all the symptoms of confirmed rabies.

Efficacy of poke root.

In the year 1797, a girl, twelve years old, was bitten by a dog in canine madness. About twelve months afterwards, she complained of much distress, and said she was 'going mad.' Her hands and feet were cold and clammy, and her countenance quite pale. Her fits came on regularly twice in twenty-four hours, and lasted about one hour each time. If cats or dogs, to which she had an utter abhorrence, came in her sight, they never failed to bring on the fits. In the fits she had a prodigious strength; so that three people were required to keep her in the house. It did not appear she had that aversion to fluids that is common. She had been so ill, that her friends had made her a coffin, when a travelling man prescribed as much poke-root, (*phytolacea decandria,*) rubbed into a powder, as would lie upon the point of a case-knife, infused into a gill of new milk, which dose was to be repeated three times a day. She found an alleviation of the symptoms after a day or two, and by continuing the medicine, she was soon restored to perfect health.

Signs of madness in dogs.

The first symptom of canine madness in dogs is a failure of appetite in a small degree; that is, the dog does not eat his ordinary food with his usual eagerness, though, if better food be offered him, he may eat it greedily. A disposition to quarrel with other dogs, comes on early in the disease. A total loss of appetite generally succeeds; though dogs sometimes eat and lap water, the day before their death, which generally happens between seven and ten days after the first symptom has appeared. A mad dog will not cry out on being struck, or shew any sign of fear on being threatened, though he will very late in the disease, appear sensible of kind treatment.

A mad dog never shows symptoms of the disease in less time after the bite than ten days; and many dogs have died mad as late as eight months after the bite. The symptoms generally appear between three aud eight weeks after the bite.

A mad dog in the height of the disorder has a disposition to bite all other dogs, animals, or men. When not provoked, he usually attacks only such as come in his way; but, having no fear, it is peculiarly dangerous to strike at, or provoke him.

Mad dogs appear to be capable of communicating the infection early in the disorder, and as soon as they begin to quarrel with or bite other dogs.

The eyes of mad dogs do not look red or fierce, but dull, and have a peculiar appearance, which is easily distinguished by such as have been used to observe it, but not easy to be described.

Mad dogs never bark, but occasionally utter a most dismal and plaintive howl, expressive of extreme distress; and which they who have once heard can never forget. So that dogs may be known to be going mad, without being seen, when only this dismal howl is heard.

Mad dogs do not foam or froth at the mouth, but their lips and tongue appear dry and foul, or slimy.

Though mad dogs generally refuse both food and drink in the latter stage of the disorder, yet they never shew any abhorrence or dread of water; will pass through it without difficulty, and lap it eagerly to the last. But it is remarkable, that though they lap water for a long time, and eagerly, and do not seem to experience any uneasiness from it, yet they do not appear to swallow a single drop of it: for however long they may continue lapping it, no diminution of quantity can be perceived.

This disorder never originates from hot

weather, putrid provisions, nor from any other cause but the bite; for, however dogs may have been confined, however fed, or whatever may be the heat of the season, the disorder never commences without being traced to that cause.

The hairs of a mad dog do not stand erect more than those of other dogs. There is nothing remarkable in the manner of a mad dog's carrying his head or his tail. Dogs are not more afraid of a mad dog than they are of any other dog that seems disposed to attack them.

There are two kinds of madness, both of which originate from the bite of the same dog. Among huntsmen, one is known by the name of *raging*, the other by that of *dumb madness*. In dumb madness, the nether jaw drops, and is fixed, the tongue hangs out of the mouth, and slaver drops from it. In raging madness, the mouth is shut, except when the dog snaps or howls, and moisture drops from it.

MISCELLANEOUS DISORDERS.

Sea sickness

Is not attened with fatal consequences, and may even, in certain cases, be beneficial to health, yet, during its continuance, few disorders are more distressing and irksome to the patient.

The seas, in which this disorder attacks the passenger with the greatest violence, are those where the waves have a long uninterrupted freedom of action; of course, bays, gulfs, and channels, may be navigated with less inconvenience, as the waves meeting with more frequent resistance, and the repercussion being considerably stronger, the vessel does not experience that vacillation which sickens the stomach and renders the head giddy. By the same argument, a person feels less inconvenience from the disorder on the wide ocean in a small vessel, on which the slightest motion of the waves makes a strong impression. He is likewise less exposed to it in a *very large* vessel, as in a ship of the line, or a large merchantman deeply laden, as the waves in this case scarcely affect the vessel. It is in ships of the middling size, and which carry but a light cargo, that the passengers suffer most. This disorder affects people in years less than young persons; those of a dark less than those of a fair complexion; and it seldom attacks infants. The duration is not limited to any fixed period of time; with some it lasts only a few days, with others, weeks, months, and even during the whole course of the voyage. The sooner it takes place after embarkation, the greater probability is there of its continuance. It does not always cease immediately on landing, but has been known, in some cases, to continue for a considerable time. Even the oldest and most skilful seamen have experienced a relapse, especially if they have quitted the sea-service for a long term of years. In asthmatic complaints this disorder has been found highly conducive to the restoration of health; for which reason it is customary to recommend a voyage to Lisbon to patients labouring under consumptive diseases. Persons affected with the gout, rheumatism, or hypochondria, whose fibres are relaxed, or who labour under indigestion, experience the greatest inconvenience and uneasiness from sea-sickness.

The following may be recommended as the most efficacious modes of precaution for preventing, or at least mitigating, the effects of the disorder.

Prevention.

1. Do not go on board immediately after eating; and, when on board, do not eat in any great quantity at any one meal.

2. Take strong exercise, with as little intermission as possible; for instance, assist at the pumps, or any other active employment, as indolent and slothful passengers always suffer most from the disorder.

3. Keep much upon deck, even in stormy and rainy weather, as the sea breeze is less liable to affect the stomach than the stagnated air of the cabin, which is frequently rendered infectious from want of sufficient circulation.

4. Do not watch the motion of the waves, especially when strongly agitated with tempest.

5. Avoid all employments which harass the mind, as reading, study, meditation, and gaming; and, on the other hand, seek every opportunity of mirth and mental relaxation.

6. Drink occasionally liquids impregnated with carbonic acid, as the froth of strong fermented beer, or wine mixed with Seltzer water, and fermented with pounded sugar, or a glass of Champaigne.

7. It will be found of great service to take the elixir of vitriol dropped upon lump sugar, or in peppermint-water; or 10 drops of sulphuric ether.

With regard to eating, it is advisable to be very sparing, at least not to eat much at one meal. The proper diet is bread and fresh meat, which should be eaten cold with pepper. All sweet-savoured food should be carefully avoided, and the passenger should refrain from fat, but especially from all meat that is in the least degree tainted. The fumes of vinegar may be inhaled with great benefit. The drink should consist of acid wines, lemonade, or Seltzer water, but never of common water. The passenger would do well to drink little and often. As experience has proved that an accidental diarrhœa has frequently relieved the patient from sea-sickness, it will be prudent to take a gentle laxative, or, if circumstances will permit, a clyster of salt water and Venice soap, which is the more necessary, as seafaring people are liable to obstructions in the bowels. It will further be found useful to apply to the pit of the stomach a tonic anodyne plaister, spread upon leather, and covered with linen.

Treatment.

If symptoms of vomiting appear, they may frequently be remedied by the patient prostrating himself in a horizontal position, upon the back or belly, and lying perfectly still.

We would recommend likewise a gentle compression of the abdomen. But if the fits of vomiting are too violent to be repressed, it is best to promote them by a strong dose of salt water, an expedient, however, which must not be too often repeated, as it tends still more to weaken the stomach. When the emetic takes effect, let the patient bend his body, advancing his knees towards the breast, and support his head against a firm and solid resting place. He must be particularly careful to untie his garters and cravat, as this precaution will secure him from the risk of a rupture, and from the ill effects of the blood rushing violently towards the head and breast.

Regimen, &c.

After the vomiting has subsided, its return may be guarded against by preserving a state of repose, and even keeping the eyes shut for a considerable time. Let the patient choose a cool, ventilated place, remembering to keep himself warm and well clothed, as perspiration is highly salutary. But he must not indulge in too long sleep during the day-time, as this induces torpidness. In the morning he should constantly take a gargle of sugar dissolved in vinegar. Let him eat often, but sparingly, and if he can content himself with a dish of chocolate, coffee, or strong tea, he will reap still greater benefit. He should never drink water in its pure elementary state, but mix it with brandy, vinegar, or wine. In the morning, instead of brandy, he may take a glass of wine, with an infusion of orange-peel, gentian root or peruvian bark. A glass of punch taken occasionally, will prove of very essential service as it promotes perspiration.

Persons in the habit of smoking, will find a pleasant and salutary companion in the pipe, but those who are not accustomed to it will be sufferers by taking to the practice.

Sulphuric ether.

Sea sickness may be considerably alleviated by a small tea-spoonful of sulphuric ether, taken now and then in a glass of water, and applying some of the same to the temples and nostrils.

Ancient remedy.

The ancient writers recommend acid fruits, bread and vegetables soaked in vinegar, after the stomach has been cleansed by vomiting; but not to attempt to suppress the vomiting until that end is obtained.

Sea water.

An old remedy for sea-sickness, and a very common one among sailors, is a draught or two of sea-water, which, though a disgusting beverage at such a time, yet which, when the first passages are foul and loaded, generally produces the desired effect, when the perturbation it occasions ceases.

Soda water, infusion of ginger, &c.

In the intervals of vomiting, draughts of soda water, or an infusion of chamomile or ginger should be taken. Acquiring the habit of walking and standing upright, is the first and greatest preventative, as a continual reeling motion of the body is the real cause of sea-sickness.

Motion of the body.

A correspondent in the *Monthly Magazine*, states, that if, on board a ship, we imitate the action of the body in a brisk trot, on horseback, no other sensation will occur, than what that action usually produces.

"I seated myself," says he, "in a chair upon the deck, and commenced a sharp libration of the body, such as it receives in trotting; and, in a few minutes, the previous nausea abated. In a quarter of an hour I recovered my spirits; in half an hour felt a desire to eat, which I indulged, to the surprise and disgust of those who were vomiting around me; in fine, I kept up the action more or less during three hours in which we were in rough water, in which time I emptied my pockets of eatables: and, afterwards, I was as well as though I had merely taken my customary morning's ride."

Holding by the sides of the vessel.

Another correspondent in the same miscellany, says, that persons who hold fast by the ropes or sides of the ship, so as to move with all its motions, and, in fact, make themselves for the time, as it were, a part of the moving vessel, are less subject to sea-sickness, than others who sit down at their ease on a chair. "I found," says he, "before I became accustomed to the sea, that I could keep off the evil entirely by laying fast hold of the rudder or sides of any boat in which I happened to be, on the very first indication of nausea.

"When a boy, I was particularly liable to sickness from the motion of a coach, and I then found the same relief from holding fast by the sides of it, instead of swinging forward with the motion of the carriage. For many years I have acquired a habit of sitting or standing in such a manner, in a moving vessel of any kind, as to move entirely with it, and thus by degrees have lost entirely the disposition to sickness.

"It must be admitted, that habitual abstemious diet has contributed its good effects; and I have known many persons avoid sea-sickness by taking a dose of calomel and aloes the day before their departure; but I believe that, *cæteris paribus*, a large majority of persons would be materially relieved by adopting the above mode of position."

Scurvy.

This disease is well known to be prevalent among sailors, and other persons in confined situations, who are, at the same time, deprived of fresh provisions, exercise, opportunities for cleanliness, and fresh water. It comes on gradually with weariness, anxiety, dejection of spirits, and loss of strength. The face becomes sallow and bloated, the teeth loose, and the gums which are spongy, bleed on the slightest touch. The respiration is hurried, by the least motion, the breath is offensive, severe wandering pains are felt, livid spots appear on various parts of the body, and old wounds and sores, which have been healed up, break out afresh. At length, universal emaciation ensues, the joints become swelled and stiff, bleeding takes place from the nose, ears and other parts of the body, and dysentery closes the scene.

Prevention.

In all long voyages it will be necessary not only to employ the most effectual means to secure the scurvy, but likewise to prevent its arising at all, as the taint never fails to give a malignant tendency to the other disorders incident to seamen, such as ulcers, dysentery, &c. With this view, the preventive plan ought to commence from the first day on which the sailing stock of fresh vegetables and ship's beer is expended; since from many experiments it appears, that much greater success is likely to attend endeavours in this way than by reserving them for the period in which the marks of a scorbutic character begin to manifest themselves.

Regimen, &c.

When the scurvy makes its appearance among a number of men, be it on board of a ship or in a close garrison, the putrid state of the system is to be obviated by a diet of fresh animal and vegetable food, but more particularly the latter, consisting of garden and water-cresses, mustard, horse-radish, common radish, scurvy-grass, celery, endive, and lettuces, all of which may be eaten in their raw state; together with spinach, beet, carrots, turnips, cabbages, cauliflowers, brocoli, asparagus, the young shoots of hops, &c. which may be prepared by any common process of cookery. To these may be added a free use of ripe fruits, as oranges, shaddocks, and others of this class. For ordinary drink, the patient may use milk, whey, butter-milk, &c. or an infusion of malt or spruce.

Such things are, however, only to be procured on shore, and therefore cannot be obtained for a ship's crew, unless they remain in port. When at sea, other substitutes must be resorted to.

Lemon juice.

One of the most effectual substitutes of this kind has been found to be lemon juice, with which most ships belonging to Government, and bound on a long voyage, are supplied; the daily regulated allowance being one fluid ounce, mixed with one ounce and a half of sugar. To render its effects more certain, and prevent it from irritating the bowels, mix it with a sufficient quantity of water and sugar. This will make a pleasant drink usually known under the name of sherbet. If a due proportion of wine is added, it will render it still more antiseptic. The quantity of juice used during the first three or four days, ought not to exceed 2 ounces daily, but it may afterwards be increased to three or four.

Mr. Baird, surgeon to the Hector ship of war, first made known the wonderful benefit derived from the use of lemon-juice in a voyage to and from the East Indies, during which, although the scurvy became very prevalent, he did not lose a single man. His words are, "When I consider the alarming progress which the scurvy was making among the Hector's company, previous to the administration of lemon juice as a preventive; the sudden check that disease met with afterwards, and the powerful effect of the acid in very bad cases; I think I shall not be accused of presumption when I pronounce it, if properly administered, a most *infallible remedy*, both in the cure and prevention of scurvy."

Concrete citric acid.

Where the fresh juice cannot be procured, citric acid in a concrete form, may be substituted with the greatest advantage. Dr. Trotter has experienced its powers against scurvy to be equal to any effect he has ever observed from the recent fruit in its most perfect state. Other practitioners have reported alike favourably of it. From sixteen to eighteen parts of water, are required to bring the concrete acid to the standard of lemon-juice. It is obtained by combining the fresh vegetable acid with lime, and then precipitating by means of sulphuric acid.

Preservation of lemon juice.

Lemon-juice for the use of the navy, is often adulterated with vinegar, and sometimes contains the pulp, which renders it liable to ferment. Lemon and lime-juice, should therefore be procured in Portugal and the West Indies, and in each place be combined with calcareous earth. It may be imported in barrels, and in that state be sent to sea, when the separation of the liquid acid is so easy a process as to require no trouble, and the medicine will be always in the best state. Combined with calcareous earth, the acid will remain unchanged for a great length of time.

Nitric vinegar.

Mr. Patterson, surgeon in the navy, was induced to try a solution of the nitrate of potass in common vinegar in several cases of this disease, which succeeded in every one of them; and from frequent trials of it he was convinced that the scurvy may be cured at sea without the assistance of fresh vegetables. The following is his method of preparing this remedy, and likewise his manner of using it.

At first he dissolved 2 ounces of nitre in one quart of the ship's vinegar, and gave half an ounce of the solution, to some twice, to other's thrice in the day, and as frequently bathed their blotched and ulcerated limbs with the same. From the good effect it had, and from its not producing the smallest degree of nausea, colic, or diarrhœa, he was induced to augment the dose to an ounce, and to repeat it as often as before.

Finding that by far the greater number of scorbutics who were under his charge bore the increased dose of the medicine without expressing the least uneasiness, he now, instead of two, dissolved four ounces of nitre in one quart of vinegar, and gave from half an ounce to two ounces of this strong solution, twice, thrice, or four times in the day, if they were either blotched, stiff, or ulcerated.

He states that "some patients cannot bear the nitric vinegar without the addition of water; while others, without the least inconveniency, bear it undiluted. The discharge by stool, or the presence of gripes and nausea, guide me with respect to increasing or diminishing the dose of the nitric vinegar; but at the same time it is not a slight degree either of nausea, colic, or diarrhœa, that renders an alteration in the quantity of the medicine necessary. To each of a great number of scorbutic patients, eight ounces of this strong solution, containing one ounce of nitre, have in the course of the day, as long as such a quantity was necessary, been administered with the greatest success. Large and frequently repeated doses of this medicine have likewise been given in cases of *dysenteria scorbutica;* and instead of increasing I have always found it remove the disease. Sometimes, notwithstanding the free use of the nitric vinegar, I have known constipation take place to a considerable degree; in which case I have found intermediate doses of the cream of tartar necessary and highly advantageous."

Effects of this medicine.

During a cosrse of nitric vinegar the belly in general is kept gently lax; the discharge of urine is increased, and the skin becomes open and more agreeable to the touch; the chilliness is changed to a pleasing warmth, and the pulse acquires steadiness and healthy strength. Sleep comes to be more and more natural. The sallow and the gloomy is gradually changed into a clear and cheerful countenance. By degrees the inflammation of the mouth and nose subsides; the gums heal and get firm. The lower extremities lose, faster than could have been supposed, their livid hue; they gradually become softer, less painful, and more flexible, and ulcers put on a healthy appearance and skin over. The great oppression about the breast and stomach gives way, and the cough and the breathing become less laborious. The appetite and the sense of taste are restored; the depression of spirits and the lassitude are not remembered; the strength increases, and at last health returns.

Oxygen gas.

Introducing oxygen into the system, by any kind of means, may likewise prove a good auxiliary. The gases were used by the celebrated navigator La Perouse in his voyage round the world; but he very wisely observed, that bottles full of them might be swallowed without doing seamen a thousandth part of the benefit they receive from good slices of roast beef, turtle, fish, fruit, herbs, &c.

Further treatment.

In the course of the disease, particular symptoms sometimes arise which require a separate treatment. Pains of the belly are to be allayed by emollients and opiates; oppression at the chest and impeded respiration by blisters; for bleeding is never to be used; contractions of the hams and calves of the legs are to be relieved by fomenting the parts with warm vinegar and water, and by the application of emollient poultices and friction; sponginess of the gums and looseness of the teeth are to be obviated by washing the mouth frequently with either of the following.

Astringent and antiseptic gargles.

Take of infusion of roses, 12 ounces, alum, 3 drachms, honey, 2 drachms. Mix them for gargle.

Or—Take of decoction of Peruvian bark, 6 oz. tincture of myrrh, 1 1-2 oz. muriatic acid, from 20 to 30 drops.

Foul ulcers are to be cleansed and healed by washing them with lemon-juice, or a tincture consisting of equal parts of that of myrrh and Peruvian bark, and then dressing them with some kind of digestive ointment, or a poultice of sorrel. Some navy surgeons report, that they have known the most obstinate ulcers of a scorbutic nature cured by applying a paste of oatmeal and water to them, the surface being sprinkled with a solution of sugar of lead.

If, in the course of the disease, the bowels should not be loosened by the use of fresh vegetables, and costiveness prevail, give a decoction of tamarinds with a little cream of tartar, to obviate it. Where the skin is dry and parched, a gentle perspiration may be excited by the following decoction of the woods, joined with half a drachm of antimonial wine.

Take 1 oz. of guaiacum shavings, 1 oz. of sarsaparilla, 1 oz. of senna leaves, 1-2 an oz. sassafras shavings, and 1-2 an oz. of liquorice root, cut thin. Boil in 5 pints of spring water, very gently, till one half is wasted. Strain the infusion, and take a tea-cupful, slightly warm, an hour and a half before breakfast.

Treatment during convalescence.

To restore the former vigour of the system, the patient should be put under a course of Peruvian bark, with the mineral acids, chalybeates, and other tonics. He should at the same time breathe a pure, temperate, and dry air; take such daily exercise as his strength will admit of, use a generous and nutritive diet of fresh animal and vegetable food, and lead a life of great regularity and temperance.

It has been generally supposed that scorbutic patients require land air, and land recreations, for their more speedy and effectual recovery; but there is often the most urgent necessity for keeping them on board till they acquire a certain degree of strength. In his very weak state a scorbutic patient cannot bear the external air; this has been long observed, and recently confirmed by five men dying in the boat belonging to the Prince of Wales ship of war, between the Downs and Deal hospital.

Scorbutic eruptions.

In scorbutic eruptions, which arise often without any very obvious cause, and make their appearance at stated intervals in painful ulcerations producing a discharge of lymph, and an abundant peeling of the skin, a long continued course of Cheltenham water is often attended with a very good effect. Where the disease is inveterate, it may be necessary to have recourse to alterative medicines, together with spruce-beer, &c. and a diet consisting chiefly of vegetables and milk. Sea-bathing will also be proper.

Scrofula.

This disease first shows itself by inflammation and soreness in the eyes and eye-lids, and by chaps, and thickness of the lips; also by a swelling of the glands of the neck, behind the ears and in various other parts of the body. These tumours at length break out and discharge a white curdy matter. It most commonly attacks ricketty children, and others up to the age of puberty. These affections are not generally attended by pain.

Children inherit this disease from their parents, but in many cases it would never make its appearance, if the subjects of it were not exposed to moist and impure air, as in damp habitations, and large manufactories; and to unwholesome diet, which is too common among the poor; also to the want of personal cleanliness, salutary exercise, sea-bathing, and warm clothing.

Regimen and diet.

The patient ought to be removed to a dry and airy situation in the country, or in fine weather, he may take short voyages at sea. His clothing ought to be warm, a flannel shirt and drawers being worn next the skin. Moderate exercise, by riding or walking, without fatigue, should be taken twice or thrice a day. If the patient is too young or weak to take exercise, his body should be rubbed all over with a flesh-brush, or with a piece of flannel. He ought to be in bed every night, by 8 or 9 o'clock, and up, in the open air, by 5 in the morning.

His meals ought to be scanty and frequent; the diet consisting of light and digestible animal food, and the same made into nourishing broths and soups. The diet ought to be frequently changed according to the desire of the patient, and besides the above, should consist of eggs, light puddings, arrow-root, isinglass, vermicelli, and well-baked bread. If vegetables are eaten, they must be quite fresh; but the less the better. If the stomach can bear it, milk may be drank, but the beverage should generally consist of whey, or toast and water. An hour before dinner and supper, a glass of good port wine with a slice of light cake, or crust of bread ought to be taken. The warm bath, cold bath, or sea-water bath, are to be daily used, according to the convenience, feeling, and strength of the patient.

Treatment.

The bowels are to be kept open by a daily draught of sea-water, or a small portion of Epsom salts. Sea-water is chiefly serviceable where the obstructions of the glands of the neck and viscera are recent: also in obstructions of the liver, and in tumours of the joints in general, not suppurated. When the glands become softened by the internal use of the water, then bathing, with a course of Peruvian bark, will prove efficacious.

Alterative powder.

In recent cases of scrofulous swelling, mix together from 6 to 12 grains of calomel (according to the age of the patient), 2 drachms of prepared chalk, and four grains of tartar emetic. Divide into 24 parts, of which let the patient take one every morning and evening, in a little sugar or treacle.

Cliver juice.

The expressed juice of the cliver, in the quantity of half a tea-cupful three times a day, has proved very successful in correcting a scrofulous constitution, and in curing local affections of joints and glands which had resisted regular and irregular remedies. Poultices made with the recently expressed juice and fine oatmeal, have been found uniformly to correct the discharge of scrofulous ulcers, to abate the attendant inflammation, and in a short time to heal them.

Tonic electuary.

Mix with a sufficient quantity of gum water, 6 drachms of powder of Peruvian bark, and a drachm and a half of carbonate of soda. Let the patient take the bulk of a hazel nut twice or thrice a day.

Tonic mixture.

Scrofulous persons will be much benefited by taking 2 table-spoonsful of the following mixture four times a day, viz. Infusion of Peruvian bark, 10 oz. compound tincture of cardamoms, 1 oz. carbonate of soda, and syrup of orange peel, each 1-2 an ounce.

Peruvian bark alone, will likewise be of great use, if the bowels have previously been well cleansed. Mineral waters, preparations of iron, and very diluted nitric acid, have also been of great service to scrofulous persons.

For scrofulous swellings aud enlargements.

When these swellings commence, they ought to be dispersed as speedily as possible by the application of opodeldoc, soap-plaisters, acetated water of ammonia, or sea-water, with either of which repeated alternate frictions with the hand, will be of great service. But when matter is formed in the swelling, it is to be immediately evacuated by the gentle puncture of a lancet; for if the opening be made large, a disfigurement of the part for life will be the consequence.

Ointment for scrofulous ulcers.

Rub 2 drachms of borax in a mortar, with 2 ounces of spermaceti ointment or calamine cerate. This will be found to be a most efficacious application to scrofulous ulcers of all kinds.

For further dressings and after treatment, the reader is referred to page 234. For white swelling of the joints, see page 235.

Bronchocele or goitre.

The inhabitants of Derbyshire and other mountainous districts of England, also those of the Alps in Switzerland are peculiarly liable to this disorder. In Switzerland it is called goitre, and its origin is ascribed to the drinking of snow water. The external applications for this disorder, are the soap liniments and camphor embrocations, already prescribed in cases of contusions and sprains; or friction of the part with mercurial ointments. The medicines given internally, almost universally consist of the powder of burnt sponge.

The Coventry medicine for this disease.

The mode of administering burnt sponge,

as employed by Dr. Bate of Coventry, is as follows: "The day after the moon is at the full, the patient is to take a vomit, and on the succeeding day, a purge, on the third night a bolus, composed of ten grains of calcined sponge; and the like quantity of calcined cork and burnt pumice-stone, is to be placed under the tongue, and being allowed to dissolve very gradually, is then to be swallowed by degrees. This is to be repeated for seven successive nights, and in the forenoon of each day, a powder is to be given, consisting of flowers of chamomile, gentian root, and seeds of lesser centuary, of each, in powder, 5 grains. On the eighth day the purge is to be repeated; and on the wane of the succeeding moon, the same process is to be recommended, unless the disease is cured before. The vomit is only to precede the first course of the medicine.

Dr. Cheston's treatment.

Dr. Cheston has found the following plan of treatment, which is an improvement on the Coventry method, successful in very many cases in which the disease had not advanced too far. One or two grains of calomel are to be given for three nights successively, and a smart purge on the following morning. Every night afterwards, for three weeks, 1-2 a drachm of calcined sponge, formed into a lozenge with mucilage of gum arabic, is to be put under the tongue, and allowed to dissolve gradually; the solution being swallowed directly as it is formed. At the expiration of this time, if the disease be not cured, the whole is to be repeated again in the same order.

Prosser's powder for the same.

Mr. Prosser recommends the following powder to be taken an hour before breakfast, for a fortnight or three weeks, and to be repeated every alternate fortnight. Take of red sulphuret of mercury, powder of millepedes, and of burnt sponge, each 15 grains. Mix, and take in a little treacle, jelly, or honey.—Small doses of the mercurial, or blue pill are, at the same time, to be administered every night. The quantity ought to be regulated by a medical practitioner.

Tincture of iodine.

Dissolve 48 grains of iodine in 1 oz. of pure spirit of wine. Give to an adult 10 drops of this tincture in half a glass of capillaire and water, every morning, fasting: give a second dose at ten o'clock, and a third in the evening, or at bed-time. At the end of the first week the dose may be increased to 15 drops three times a day, and in a few days afterwards it may be increased to 20 drops. Dr. Coindet, a French physician, states, that in his practice, the above quantities were rarely exceeded, as he found them, in general, sufficient to dissipate the largest goitres.

Wens.

The following composition, prescribed by the late Dr. Hewson, proved successful in dispersing a large wenny tumour, which for some time threatened suffocation:—Take of Peruvian bark, 1 oz. conserve of roses, 2 oz. burnt sponge, 1-2 oz. simple syrup, sufficient to form an electuary. The size of a nutmeg to be taken three times a day.

Ointment for the same.

Reduce some quick or unslaked lime to powder; mix it with black soap, and anoint the wen with it.

Cancer.

In the early state of this disease the *alterative powder* prescribed under SCROFULA is to be administered as for that disease, and a *decoction of the wood* as mentioned under SCURVY, is to be drank as often as convenient. The diet should consist mostly of fresh vegetables, and the drink of pure water. Exercise, bathing, and fresh air are also to be attended to.—When ulcers are formed, the *carrot, yeast, charcoal,* and other poultices, mentioned in pages 233 and 234 are to be applied: The *lotion* in page 233, is likewise to be used.

Pulmonary consumption.

The too frequent causes of consumption in this island, are the moistness of the atmosphere, and the sudden changes in the temperature of the climate; to this may be added, cold from wet clothes and damp beds; also too sudden exposure to the open night air, after violent exercise, or from heated apartments, ball-rooms and theatres. Other causes of this disease are catarrh, small-pox, and measles; the use of strong liquors and frequent debaucheries; playing on wind instruments, and suckling for a longer period than is necessary, or proper for the health of the child or for the strength of the mother: this latter practice is but too frequent among the lower orders, who, being obliged to work, are glad to quiet the infant by any means, and are not aware that after the tenth or eleventh month, the milk ceases to be nutritious, whilst the constitution is much impaired by continuing to give it after that time.

Artisans are likewise liable to consumption from inhaling the fumes and small particles of the various matters which they manufacture. Among these may be mentioned flax and feather dressers, millers and bakers, stone-cutters and bricklayers, colliers and miners, needle pointers, and the melters of metals and the roasters of minerals.

Prevention and remedies.

A person labouring under consumption must first avoid whatever of the preceding or other causes, may have induced the complaint. In summer he should live in a warm, dry, and airy situation, if possible in a warmer climate; and in winter, he should confine himself in an airy chamber, heated by a common ironing stove, to about sixty-five degrees. He must avoid crowded places, take moderate exercise in the open air, and divert his mind by all sorts of harmless amusements, among which that of the theatre, if not much crowded, ought to be indulged in. Warm clothing, as for SCROFULA cannot be too much recommended, and the application of blisters to the chest and stomach will frequently be necessary, if there is difficulty of breathing in the breast or side; also when there is cough and restlessness at night, blood may be taken from the arm, or chest, by leeches or cupping; the bowels are likewise to be kept open by proper medicines. But if ulceration has taken place, these means are not to be used.

Demulcent and soothing draught.

Take of compound tincture of benzoin, 40 drops, purified honey, 1 dr. rose water, 1 1-2 oz. tincture of opium, 3 drops. Make into a draught to be taken four times a day.

Decoction of peach leaves.

The decoction of peach leaves possesses the property of allaying morbid irritation of secreting membranes, particularly that lining the wind-pipe and its ramifications. Hence, combined with expectorants, and diaphoretic medicines, it has been found highly beneficial in cases of incipient consumption of the lungs; as in the following mixture:—Take of the decoction of peach leaves, 6 oz. ipecacuanha wine, 1 dr. simple oxymel, 6 dr. Mix, and let two table-spoonsful be taken 3 or 4 times a day.

Tar vapour.

Experiments have lately been made on the use of the vapour of tar in pulmonary consumption, with very favourable results. The following is the method recommended. With each pound of tar (such as is used in the cordage of ships,) mix half an ounce of cream of tartar, heat the mixture in a sound vessel, and be careful that no combustion of any portion of the tar takes place, but merely an evaporation. The vapour may then be inhaled for several hours together. It at first sometimes occasions head-ache, but this soon goes off, and the good effects become in some days evident.

It uniformly allays cough and corrects the discharge of the lungs. Previous to its inhalation, the whole body of the patient ought to be subjected to the vapour of water, which has been found to abate hectic fever, and diminish the action of the heart and arteries. During the use of these remedies the patients are restricted from the use of wine, but not from animal food.

To discover whether ulceration has taken place.

The matter expectorated from the lungs before ulceration, is called *mucus*, or *phlegm;* whereas that produced by coughing after this has happened, is called *matter* or *pus*. It is of great consequence to distinguish the real stage of the disease; and that may be done by examining the discharge in the following manner:—

Dissolve some of it in two wine glasses, one containing oil of vitriol, and the other an equal quantity of caustic potash ley. Add distilled water to each solution. If there be no precipitation, that is, the appearance of flakey, or white cloudy matter in either, the discharge is merely mucus or phlegm, and the patient is to be treated as above. But if these appearances occur, ulceration has taken place, and the patient is to be treated accordingly.

Tincture of fox-glove.

The tincture of digitalis, or fox-glove, has been administered with the greatest success, by many physicians, in consumption of the lungs, both before and after ulceration has taken place. Doctor Drake says, "Several patients, *in its confirmed state*, have been cured by this remedy; almost all have been relieved; life has even been protracted by it; and when death has taken place, whilst the system was under its influence, it has been free from pain or struggle." Dr. M'Lane says, "It will sometimes cure when the most approved remedies fail. When, of itself, it is sufficient to subdue the disease, it will prove a valuable auxiliary to other means. It has always with me quieted and soothed the sufferings of the patient more or less: and when it ultimately failed, it lengthened the duration of life, and smoothed the avenues to death."

Preparation of the tincture.

Put into a bottle, containing 10 ounces of rectified spirit of wine, 8 ounces of the fresh leaves of purple fox-glove. Place the bottle in a warm room, and after shaking three or four times a day, for ten days, strain the tincture off into another bottle, which keep close stopped for use.

Administration.

Ten or fifteen drops of this tincture are to be given three times during the first day, and this quantity is to be increased every second day by two drops at each dose, until relief is felt, and convalescence perceived. The doses are to be diminished or augmented in the same gradual manner, for weeks or months, according to the effects produced.

If vertigo, or nausea should occur from the use of this tincture, a little lemon juice will effectually relieve it; and a few drops of laudanum may be added to each dose, to prevent its rejection from the stomach.

Diet and Regimen.

Whilst the diet is nutritive, it ought also to be easy of digestion, consisting of milk boiled with bread, toasted flour, arrow root, sago, isinglass, maccaroni, and vermicelli; also soft eggs, light puddings, jellies, and unseasoned broths, with the occasional use of raw oysters, or cockles. Gross animal food, or spirituous and fermented liquors should by no means be indulged in. Women's, asses' or mare's milk may be taken frequently, either with or without bread. If these cannot be had, cow's milk may be used after the cream has been skimmed off. The best effects have likewise been experienced by consumptive persons from the continued use of butter milk, and of Iceland moss boiled in common milk.

Asthma.

This distressing complaint comes on generally at night; the respiration being short and difficult, with a wheezing noise, cough, and tightness across the chest till at last suffocation almost takes place, if the patient is in a horizontal position. The attack is preceded on the night before by depression of spirits, fulness of the stomach, and often with drowsiness and pain in the head. It is called *humid asthma* when accompanied by expectoration;

and *dry, or spasmodic asthma*, when there is no discharge from the lungs. It is brought on by sudden exposures from heat to cold, unwholesome effluvia, full meals, the use of spirituous liquors, agitation, and too much exercise; also by cold and foggy, or smoky air, and noxious vapours.

Prevention.

The above mentioned causes of asthma are carefully to be avoided, the bowels are to be kept comfortably open, and the body is to be well clothed, particularly with flannel. The patient should likewise reside in a dry, warm, and airy situation. The preventive medicines should consist chiefly of expectorants alone, or joined with gentle purgatives, as the following:—

Expectorant mixture.

Take of milk of gum ammoniac, 6 oz. syrup of squills, 4 do. Mix together. A spoonful is to be taken every day, particularly in the morning.

Another.—Take of tincture of squills, from 20 to 31 drops, cinnamon water, rose water, equal quantities, 6 drachms. To be taken three times a day.

Expectorant and laxative bolus.

Take of conserve of squills, 1-2 dr. calomel, 2 grains, purified opium, 1-2 grain, purified opium, 1-2 grain. Make into a bolus, to be taken every night going to bed. This may likewise be used in cases of dropsy.

Treatment of the paroxysm.

The severity of the paroxysm will speedily be moderated by sitting in an upright position, and by inhaling the warm steam of an infusion of chamomile flowers, with a little ether, from the spout of a tea pot. Tar vapour and the tincture of fox-glove may also be tried, as recommended in cases of consumption.

When a discharge has been stopped in any other part of the body, a blister ought to be applied to the chest. Where an opportunity offers, oxygen gas may be inhaled with very beneficial effect to the patient.

Galvanism.

Dr. Wilson Philip, of Worcester, has employed galvanism in twenty-two cases of this disease with the most decided advantage. In every one of them immediate benefit was experienced; in most of them it afforded greater relief than any medicine that had been previously administered; and in two instances it completely succeeded. The method he adopted was to apply a piece of tin-foil to the nape of the neck, and another to the pit of the stomach. The wires from the two ends of a galvanic battery were connected with these, and the galvanism was continued for about ten minutes. At first it was very weak, being confined to three or four pairs of plates of four inches square, excited by water mixed with one twentieth of its weight of muriatic acid; but was gradually increased till it consisted of 20 or 25 pairs of plates, by removing one of the wires along the battery. The galvanism was applied once in 24 hours.

Stramonium.

Occasionally taking a few whiffs of the stramonium in a pipe, as tobacco, taking care at the same time to swallow the saliva produced by the action of the smoke, will afford great relief in asthma.—The root and lower part of the stem should be cut into small pieces, and put into a common tobacco pipe. In a particular instance, the sufferer was relieved from all convulsive heavings in a few minutes, and dropped into a comfortable sleep, from which he awoke much refreshed, and, upon the whole, perfectly recovered. Drinking with the pipe should be avoided; but a dish of coffee taken after it will be found refreshing.

The plant is delightfully fragrant; it has been generally regarded as of a poisonous nature; but in the above case, the individual has smoked a dozen pipes at a time without experiencing any other inconvenience than a slight excoriation or soreness of the tongue.

The sufferer had been subject to periodical attacks for several years, but now enjoys perfect health. This remedy ought to be more known among those who are most deeply interested in its virtues.

Tonic mixture.

In asthma attended with debility of the system, with the smoking of an anodyne herb, tonic medicines must be employed, combined with expectorants, as the following: Take of infusion of cascarilla, 6 oz. oxymel of hedge hyssop, 3 oz. Dose, three table-spoonsful 3 times a day.

Accompanying pills.

If great debility of the system should be indicated by swelling of the legs and paleness of the skin, two of the following pills may be taken with the above mixture. Take a prepared steel and squill pill, each, 1 dr. Mix, and divide into 24 pills.

Regimen.

The diet of asthmatics must be always regulated according to the state of the system. In the super-irritative species, a low diet should be observed, and stimulants, particularly wine and spirits, should be avoided. In the sub-irritative, the diet, on the contrary, should be nutritious and easy of digestion; the inside of boiled or roast beef should be preferred, and these well masticated. Fermented liquors are bad in both species, on account of becoming acid in the stomach, and occasioning a disengagement of air. In the former species, water is the best beverage; but in the latter, a little brandy may be added, or gin, if the disease be attended with a scarcity of urine.

Treatment of the ague.

Take of yellow Peruvian bark, in powder, 6 drachms; or of red bark 1 1-2 oz. Divide into 12 portions, of which give one in some milk every 2 hours in the interval of the ague fits. When this comes on, let the patient take 30 drops of vitriolic ether and 15 drops of laudanum in a decoction of liquorice; after which, a cupful of warm decoction of liquorice may be given frequently until the sweating is over; when the bark is to be resumed as before.

Another preparation of bark.

Give the following powder every two hours during the intermission.

Take of Peruvian bark, in powder, cinnamon bark, ditto, each 50 grains, sweet flag root, ditto, 20 grains. Mix.

Holly hock leaves.

In a memoir presented to the Academy of Medicine at Paris, in 1822, Dr. Rousseau established the fact, that holly-hock leaves (*ilex aquifolium*) are a medicine as efficacious as the powder bark, against intermittent fever. From the first day of administering the remedy he succeeded in arresting the progress of several intermittent fevers, by giving the patients, two or three hours before the attack, a dose of one drachm of holly-hock leaves, in powder, and macerated in a glass of white wine during twelve hours.—*Bulletin des Sciences.*

Compound infusion of quassia.

Make an infusion of 4 drachms of bruised quassia bark, for an hour, in 16 oz. of boiling water. Pour off or strain the liquor, and add, 1 oz. each, of tincture of cascarilla, and compound tincture of cardamoms. A wine-glassful is to be given to the patient every three hours.

To prevent a relapse.

Besides using the above medicines in the intervals of the fits, it will be proper to take them occasionally for several weeks after to prevent a relapse. This is particularly to be attended to during damp weather. In cases of recovery, the bark powder in port wine will be found a very excellent medicine.

Regimen, &c.

During the continuance of the fits, the food ought to be very light and easy of digestion, consisting of arrow-root, sago, and light puddings; but afterwards, animal food and wine may be taken in moderation. If the patient resides in a swampy or marshy district, as Lincolnshire and some parts of Essex, he ought to remove, as speedily as possible, to one of a drier and more airy nature.

Diuretic decoction for dropsy.

The following decoction, the preparation of which has long been kept a secret, has carried off the water from several persons labouring under dropsy:

Take of artichoke leaves and stalks, 3 handsful, bruised juniper berries, 1 quart, scraped horse-radish, one handful, green fir tops, 2 do. bruised white mustard seed, 2 table-spoonful. Mix the whole, and boil them in 2 gallons of water to 1, and strain the liquor through a cloth. A grown person is to take half a pint morning and evening, adding a little syrup or sugar if agreeable.

Another remedy.—Take of recent squill dried in powder, 4 grains, crystals of tartar, in powder, 1 scruple. Make in a powder, to be taken night and morning in a cup of barley water sweetened with a lump of white sugar.

Remedy for jaundice.

Infuse 8 oz. of artichoke leaves in a quart of barley-water for 12 hours, then strain off the liquor, and take a quarter of a pint every morning and night.

Another.—Take of castille soap, 1 oz. oil of juniper, 30 drops. Mix well together, and divide the mass into 96 pills, 2 to be taken twice a day.

Another.—Mix together 4 drachms of hard soap, 1 do. of compound powder of cinnamon, 2 do. rhubarb, in powder, and 16 drops of oil of juniper, with a sufficient quantity of syrup of ginger. Make the whole into 100 pills, of which three are to be taken, morning and evening.

Removal of biliary calculi or gall stones.

The *Bibliotheque Medicale* for August, 1813, contains an account of a wonderful cure of obstruction in the liver, occasioned by biliary calculi. The remedy employed consisted of a combination of 3 oz. of sulphuric ether, with 2 oz. of oil of turpentine. The dose of this mixture was half a drachm every morning and evening, with a draught of milk-whey, or veal broth, immediately afterwards. Fifteen calculi, each of the size of an olive, were voided during the six months that this solvent was administered; after which the patient was restored to perfect health. *M. Guyton de Morveau* recommends a combination of ether, with the yolk of eggs, as giving less pain than that of ether and turpentine, when the patient suffers much from the expulsion of the calculi.

Remedy for gravel.

Take of the essential oil of spruce, 1 scruple, spirit of nitric ether, 1 oz. Mix. A teaspoonful to be taken two or three times a day, in a tea-cupful of the decoction of marsh-mallow root.

Another.—Great relief has been derived from the use of the following mixture, in some obstinate cases of stone and gravel.

Take of rectified oil of turpentine, sweet spirit of nitre, oil of juniper, balsam of sulphur, each half an oz. Mix. Fifteen or sixteen drops to be taken in a wine-glassful of water, 3 times a day.

Another.—Take of Venice turpentine, 1 oz. powdered gum arabic, 2 oz., powdered grains of paradise, and powdered jalap-root, each 2 drachms, balsam copaiva, sufficient to form an electuary. The size of a walnut to be taken twice a day.

Another.—Take of Venice turpentine, castille soap, rhubarb powder, extract of cascarilla, each one drachm, essential oil of juniper, 30 drops. Mix well together, and divide into 50 pills. Three to be taken twice a day, with a wine-glassful of an infusion of wild carrot seed.

Another.—Take of Alicant soap, 8 oz. fresh lime, finely powdered, 1 oz. oil of tartar, 1 drachm. With sufficient quantity of water for a mass, and divide it into 5 grain pills; from 3 to 4 of which should be taken daily. This is the celebrated receipt of Mrs. Stevenson, for stone and gravel, improved by Dr. Hartley.

Another.—Boil 36 raw coffee-berries for one hour in a quart of soft spring or river water, then bruise the berries and boil them again another hour in the same water; add thereto a quarter of a tea-spoonful of the dulcified spirit of nitre, and take daily a half-pint cup of it at any hour that is convenient; its efficacy will be experienced after taking it for two months.

African remedy.

The following means of curing the stone have lately been published by an African negro:—"Take a quarter of a pint of the expressed juice of horse-mint, and a quarter of a pint of red onion juice, evening and morning, till the cure is perfected. White onions will not have the same effect as red. To obtain the juice they may be cut in thin slices, and well salted, and bruised between two pewter plates. It is, however, the juice of horse-mint which possesses the most virtue in this disorder; a strong decoction of which, will generally, in time, effect a cure."

Incontinence of urine.

When this troublesome disorder occurs, the patient is recommended to practice cold bathing, and at the same time to take bark, steel, and other tonic medicines, internally. Cold lotions of vinegar and water, or spirits diluted with three times their quantity of water, are likewise proper to be applied to the lower part of the belly; at the same time, that cold water, or vinegar and water, is daily dashed over the genitals and parts adjacent. When these means fail, it will be proper to take the following draught, three times a day; viz. one scruple of Chios turpentine dissolved (by rubbing in a mortar) in the yolk of an egg, and afterwards mixed with an ounce and a half of cinnamon water. One third of this quantity will be sufficient for a child.

Cramp in the leg.

A garter applied tightly round the limb affected, will, in most cases, speedily remove the complaint. When it is more obstinate, a brick should be heated, wrapped in a flannel bag, and placed at the foot of the bed, against which the person troubled may place his feet. No remedy, however, is equal to that of diligent and long continued friction.

Cramp in the stomach.

If the person affected has any inclination to vomit, he ought to take some draughts of warm water, or weak chamomile-tea, to cleanse the stomach. After this, if the body be costive, a laxative clyster may be given. But in a disorder of this nature, not a moment should be lost in procuring medical aid.

Treatment of palsy.

This disorder is more or less dangerous, according to the importance of the parts affected; it is accompanied with a loss of sense or motion, or of both, in one or more parts of the body. The patient, if young, should be bled, blistered, and have purgative medicines administered; but if advanced in life, a contrary mode must be adopted, viz. the warm bath, external application of stimulant liniments, the flesh-brush, &c. In a convalescent state, persons affected with palsy should take as much exercise as their strength will permit; keeping themselves warm with flannels, &c. and carefully avoiding every thing chilly or damp.

Treatment of hypochondriasis.

This disease, which is likewise called *vapours*, and *spleen*, affects the imagination, and is attended with great anxiety and fear; and sometimes uncommon cheerfulness. It arises, in general, from indigestion, a sedentary life, too intense application to study; gross and viscid diet, profuse evacuations, and violent passions.

The diet should consist of such food as is light and easy of digestion. Pyrmont water should be drank, and exercise, particularly on horseback, ought to be used. Repeated emetics are proper, and due attention is to be paid to the state of the bowels.

If pain and flatulence, with head-ache, attend, the patient is to be treated as for INDIGESTION, to which the reader is referred.

Cold bathing is also highly useful, in most hypochondriac cases, proper evacuation having been first premised.

Convulsions, or spasms.

In case of convulsions or spasms, opium is to be given, joined with assafœtida, as follows:—

Take of assafœtida, 1 scruple, musk, 6 grains, laudanum, 10 drops; and as much syrup as will make a bolus.

The following tincture is likewise of great service, if used daily and continued for a length of time.

Infuse in 2 pints of spirits, for seven days, 2 ounces of Peruvian bark, orange-peel, and gentian-root, of each 1 1-2 ounce. A table-spoonful is to be taken morning and evening in the same quantity of spring water.

The use of this should be principally in spring and winter, accompanied with chalybeate waters, and regularly continued exercise.

If there be heat and quickness in the pulse, bitters and steel medicines will be improper. But a cold infusion of the bark, with elixir of vitriol may be used.

Dr. Buchan's prescription for a nervous lady.

Apply a Burgundy pitch plaister over the region of the stomach, and let it continue on as long as it will stick.

Take a tea-spoonful of the tincture of the columbo root in half a glass of cold spring water twice or thrice a day.

Walk or ride out every day, eat solid diet, take a cheerful glass of wine, and keep company with friends of a cheerful temperament; and you will not require either physicians or physic.

For low nervous fever.

Take of bark, in powder, 2 scruples, cascarilla, powder, 10 grains.

Form a powder, to be taken every six hours in a glass of red wine.

Treatment of putrid fever.

Take of bark, in powder, 2 scruples, snake root, 1 scruple.

Make into a powder, to be taken every three hours in some porter. This is given in the advanced stage of putrid fever; some food of the farinaceous kind is to be taken an hour after. Sometimes to the powder mixed with porter, a desert-spoonful of yeast is added, which produces a wonderful and unexpected result in cases the most forlorn.

Remedy for tic doloreux.

Mr. Kerrison has lately administered the Peruvian bark in full doses, with complete success, in several cases of long standing and obstinacy of this distressing disease. He advises the powder of the best pale Peruvian bark to be given to the extent of a drachm every two or three hours, in milk and water; and if the stomach will not bear this quantity, from twenty to thirty grains, with half a drachm of the resinous extract of the same species, as frequently as the stomach will bear them. In one case a drachm of the powder was given with half a drachm of the resinous extract (dissolved in water) every two hours. This treatment, for the first week, generally aggravates the disease, which portends favourably; for in every instance, after persisting in its use a few days longer, the pain gradually abates till it entirely ceases. The cures which have been thus effected appear to be permanent.

SUSPENDED ANIMATION.

Suspended animation may arise from hanging, drowning, inhaling noxious air, &c. &c.

Fainting fits.

In warm weather, and in crowded assemblies, fainting fits are not unfrequent. When a case of this kind occurs, let the person be removed as soon as possible to the open air, and laid in a horizontal position with nothing tight remaining about him. Should the powers of life not have been previously exhausted by disease, fatigue, or want of food, a recovery generally takes place after a short interval, and often without any thing being done; but should this not be the case, the feet and legs may be immersed in warm water, and the nostrils stimulated by applying spirits of hartshorn, a few drops of which may be afterwards drank in a glass of water. If these fail, inflation of the lungs and the means (to be afterwards mentioned) resorted to in cases of drowning should be had recourse to.

Apoplexy.

Apoplexy is a sudden privation of all the senses and motions of the body. except those of the heart and lungs. It may be divided into two species; the *sanguineous* and *serous*. The first occurs in plethoric subjects, particularly those who are short, robust, and ruddy, and who have thick short necks, and is caused by the blood distending the vessels, and compressing the brain; or by an extravasation or pouring out of blood upon the brain. The second arises from a collection of serous humour in the ventricles of the brain, and the subjects of it have generally a weak constitution.

In this disease, the patient falls down suddenly, with a total and instant privation of all the powers of sense and voluntary motion; the mouth is generally open, and a spontaneous discharge of urine and stool frequently attends.—The face is red and bloated; the vessels are full and turgid about the temples; the eyes swell and sparkle; the heart beats quick and strong; and then often languid and slow; sometimes, though rarely, the patient foams at the mouth; but a stertor, or sonorous breathing, generally attends. The chief difference between a person in an apoplexy and one asleep is, that we can awake the one and not the other.

Prevention.

The usual forerunners of the apoplexy are, giddiness; pain and swimming of the head; loss of memory; drowsiness; noise in the ears; the night-mare, and laborious respiration. When persons of an apoplectic make, observe these symptoms, they have reason to dread the approach of a fit, and should endeavour to prevent it by bleeding, a slender diet, and opening medicines.

In cases of apoplexy all that should be done, till medical or other aid arrives, is as follows:—Every method must be taken to lessen the force of the circulation towards the head, the patient should be kept perfectly easy and cool; his head is to be raised pretty high, and his feet suffered to hang down; his clothes ought to be loosened, and fresh air admitted into his chamber; his garters should be tied pretty tight, by which means the motion of the blood from the lower extremities will be retarded.—All applications of spirits or other strong liquors must be avoided.—Volatile salts held to the nose, do mischief. Emetics must not be given.—If inclined to sweat, it may be promoted by pouring into the mouth a small quantity of wine whey.—In some cases a plentiful sweat, kept up for a considerable time, has carried off a serious apoplexy.

We should very carefully attend to the distinction between the *sanguineous* and *serous* apoplexy, the latter of which is often followed by palsy.

In the *sanguineous* a medical man will bleed plentifully and boldly from the jugular vein, by a large orifice: he will also cup the back part of the head, with deep scarifications, in order to open the occipital veins: this is of great use. When a surgeon is not at hand, a skilful person may bleed plentifully in the arm. Bleeding in the foot is also proper; indeed, nothing but extreme weakness can contra-indicate a loss of blood.—Next, inject stimulating and sharp clysters, and if possible give a dose of tincture of jalap and tincture of aloes. Apply blisters to the legs and thighs; and if none of these means should rouse the patient, rub a hot iron on the soles of the feet. After the patient returns to his senses, the body should be kept open by some gentle cathartic.

As emetics are highly dangerous in the sanguineous apoplexy, so they are often essentially necessary in the apoplexy arising from a pituitous or serous humour. Antimonial wine will be proper on this occasion. A pinch of Scotch, or other strong snuff, or even hellebore, may be blown up the nostrils, to excite sneezing.

Regimen and diet.

To prevent a relapse, due care should be taken to keep the body open with some aloetic medicine; the feet warm, the neck never too tightly bound, and meat or hot suppers should by no means be allowed. Issues, setons, and perpetual blisters are of great advantage in these cases. If the recovery is from a *sanguineous apoplexy*, the patient should carefully avoid malt liquors and all salt, acrid diet: such as salted and high seasoned meats, mustard and horse-radish, onions, spices, generous wine, &c. and should confine himself chiefly to a soft, mild, opening vegetable regimen.

But this kind of diet will be very proper after a recovery from the *cold pituitous apoplexy*; assisted by emetics and cathartics, repeated at proper intervals, with a course of chalybeate waters, brisk exercise, and dry frictions.

Insensibility from intoxication.

Intoxication greatly resembles that of an incipient palsy or apoplexy. Inebriated persons stagger in all directions; they stammer; every thing appears double; the tongue is in a manner paralytic, and they are deprived of the faculty of speech. This imbecility extends to the mind, which is thus rendered totally incapable of reflection. As the brain is overcharged with blood, the vessels pressing on that part are very liable to burst, from the least accidental concussion: and the unfortunate victim of such folly may expire, while he remains insensible of his danger. Hence he ought to be conveyed into a cool, rather than a warm room, and placed between blankets, with his head considerable raised; but the legs should be in a pendant situation, and the feet bathed in luke-warm water. Every tight ligature of the shirt, waistband, garter, &c. must be immediately relaxed, and diluent drinks, such as barley or rice-water, plentifully given, though in small portions. Next, a gentle emetic is to be introduced, and the throat stimulated with a feather dipped in oil; after vomiting, the patient generally falls into a profound sleep, from which he awakes weak, trembling, and afflicted with a violent heart-burn.

Apparent death from intoxication.

When persons are found in this situation, if the countenance be swollen, and of a dark red, or purple colour, and these appearances do not go off upon keeping the body for a short time in an erect posture, it will be proper to take some blood from the jugular veins, or apply cupping-glasses to the neck.

Application of cold.

When the pulse and breathing continue, and the body is hot, cloths dipped in cold water, and applied to the head, neck, stomach, and breast, have often been of service in restoring intoxicated persons to life and sense: these applications will frequently render bleeding unnecessary.

Emetics.

Of all the remedies that have been tried in such cases, an emetic contributes most speedily to recovery. For this purpose, three or four table-spoonsful of ipecacuanha wine, or thirty or forty grains of ipecacuanha in powder, may be administered, and the operation promoted when it has begun, by plenty of lukewarm water. Should the person be incapable of swallowing, the emetic may be introduced into the stomach by means of a syringe.

Clysters.

If the emetic fails to operate, half a pint of lukewarm water, with two heaped table-spoonsful of common salt dissolved in it, should be given as a clyster. It will be necessary to repeat the emetic or clyster, if the first that was given has not produced the wished-for operation.

Position, &c.

The best position for the body to be placed in, is, lying on one side, with the head and shoulders raised by pillows.—After the person is so far recovered as to be suffered to go to sleep, he should be carefully watched, lest his neck be anywise bent, or his head slip down under the clothes, or hang over the side of the bed. Care should also be taken, that nothing tight be allowed to remain about the neck.

If the hands and feet become cold, they must be put into warm water, or wrapped in flannels well rung out of the same, to be changed for others as they cool. And if necessary, bottles of hot water, or heated bricks, covered with flannel, may afterwards be applied to the feet, &c.

When the ordinary signs of life have disappeared, the same measures afterwards recommended for drowned persons, will be proper; observing, however, always to administer a brisk emetic, or sharp purgative clyster, as soon as the pulse and breathing are fully renewed.

Suffocation by noxious vapours.

Noxious vapours arise from various sources, as from all malt liquors, during fermentation, and from brick and lime kilns whilst burning. They are also found to occupy deep vaults, sewers, pump wells, wells of ships, coal pits, mines, and other places that have not a free circulation of air.

Prevention.

The dangerous effects of vapours may be prevented by procuring a free circulation of air, either by ventilators, or opening the doors or windows where it is confined, or by changing the air, by keeping fires in the infected place, or by throwing in stone-lime recently burnt and powdered.

Affusion of cold water.

When the accident is recent, and the body retains its heat, the application of cold water to the head, neck, breast, and other parts has been found of great service in promoting recovery. For this purpose, the body should be stripped naked, and laid in the open air, upon a shutter or boards placed in a slanting position, so that the head and shoulders may be considerably elevated. The cold water is then to be dashed smartly and repeatedly upon different parts, and especially upon those mentioned above, until the temperatuie of the body be reduced to the natural standard, or until signs of life appear. If the body, however, be under the natural temperature, it will be necessary to apply heat.

Inflation of the lungs.

In the mean time, the lungs should be diligently inflated, and the nostrils stimulated, as directed in cases of drowning.

Bleeding.

Where the veins of the neck appear very turgid, some blood may be taken from them, by the lancet or by cupping glasses.

Purgatives and emetics.

A violent pain in the stomach sometimes takes place after recovery, this may be removed by giving a brisk purgative or emetic, which will evacuate a great quantity of bile.

Suffocation from charcoal fumes.

When suffocation proceeds from fumes of charcoal, a slight inconvenience is at first perceived, followed by debility and insensibility; the pulse and respiration become slow, and at last death ensues.

If the person is only so much exposed to this vapour as to stagger, on coming into the fresh air it goes off; but the head remains affected. When he continues so long that the sleepiness comes on, he should be immediately bled, cold water thrown upon the head, &c. and stimulating applications to the feet. There are many instances of recovery by these means, even when respiration had ceased, and some part even of the animal heat has been lost. If life does not soon return it will be highly proper to inflate the lungs, &c. as above.

Suffocation by strangling or hanging.

In hanging, the external veins of the neck are compressed by the cord, and the return of the blood from the heap thereby impeded, from the moment that suspension takes place; but as the heart continues to act for a few seconds after the wind-pipe is closed, the blood which is sent to the head during this interval, is necessarily accumulated there. Hence it is, that in hanged persons the face is greatly swollen, and of a dark red or purple colour; the eyes are commonly suffused with blood, enlarged, and prominent.

From the great accumulation of blood in the vessels of the head, many have been of opinion, that hanging kills chiefly by inducing apoplexy; but it has, however, been clearly proved, that in hanging, as well as in drowning, the exclusion of the air from the lungs is the immediate cause of death. From which we may infer that the same measures recommended for drowned persons, are also necessary here; with this addition, that opening the jugular veins, or applying cupping glasses to the neck, will tend considerably to facilitate the restoration of life, by lessening the quantity of blood contained in the vessels of the head, and thereby taking off the pressure from the brain. Except in persons who are very full of blood, the quantity taken away need seldom exceed an ordinary tea-cupful, which will, in general, be sufficient to unload the vessels of the head, without weakening the powers of life.

By smothering under bed clothes.

From inattention and other causes, young children are frequently smothered in beds and cradles. When this happens, without their having been bruised by overlaying, &c. the functions of life are suspended merely for the want of *vital air.* The vital organs are found to have sustained no particular injury; the lungs are collapsed, and the *right* cavity of the heart, and the large vessels belonging to it, are distended with blood.

If the body be hotter than is natural (which is often the case,) it should be exposed to a current of air, and sprinkled with cold water. The lungs should be immediately inflated, and the body afterwards treated as in the case of drowned persons.

Suffocation by choking.

If the substance detained within the gullet, be of an alimentary or harmless nature, it may be safely pushed down by means of a heated and oiled wax-candle, to render it flexible; or by a piece of whale bone, wire, or flexible wood, with a bit of sponge at the end of it.

On the contrary, if the substances swallowed are indigestible, such as pins, needles, pieces of bone, glass, buckles or other pointed bodies, immediate attempt should be made to extract them. When they have not descended too low, the fingers will frequently be sufficient to reach and withdraw them, but if they be deeper within the gullet, other means must be instantly adopted, as delay may prove fatal. For this purpose, the most simple instrument is a crotchet, or a kind of hook, made of smooth and thin iron wire, by bending it into an oblong ring at one end, reflecting the wire to the top, and forming a large handle: thus, no pointed part will injure the throat by introducing the hook; and there will be no danger of its slipping from the operator's hand.

As, however, the construction of such a crotchet requires some ingenuity; and as wires may not always be at hand, there is another more simple and expeditious method of procuring relief, (when the substance does not fill up the whole passage) by means of a small piece of dry sponge, or tough meat, which should be fastened to a fine silk or linen tape, so that after swallowing the sponge or meat, it may again be gradually extracted. Thus we have frequently seen pins, or sharp pieces of bone, removed without farther inconvenience. In order to facilitate the operation, a little lukewarm milk or water should be swallowed by the patient, before the string is withdrawn from the throat.

If, however, none of these expedients prove successful, it will be necessary either to administer an emetic, consisting of half a drachm of ipecacuanha in powder, to be taken in a draught; or, if the patient be unable to swallow, to excite vomiting by stimulating his throat with a feather dipped in sweet oil;—

and, if this attempt likewise be ineffectual, a clyster, made by boiling one ounce of tobacco in three quarters of a pint of water, and then straining the decoction, should be given in dangerous cases. After these remedies have been fairly tried, no other prospect remains of saving the patient's life, than by opening the wind pipe, an operation which in the hands of a skilful person, is neither difficult nor painful to the person threatened with suffocation.

In this, as well as in other accidents, which may be attended with fatal consequences, a professional gentleman should be always sent for with the least possible delay.

Suffocation by drowning.

There seems to be a great similarity between the death occasioned by immersion in water, and that by strangulation, suffocation by fixed air, apoplexy, epilepsy, sudden faintings, violent shocks of electricity, or even violent falls and bruises. Physicians, however, are not agreed with regard to the nature of the injury done to the animal system in any or all of these accidents. It is indeed certain, that in all the cases above mentioned, particularly in drowning, there is very often such a suspension of the vital powers as to have the appearance of a total extinction of them; while yet they may be again set in motion, and the person restored to life, after a much longer submersion than has been generally thought capable of producing absolute death.

Physicians differ considerably in prescribing the methods to be followed in attempting the recovery of drowned persons. De Haen recommends agitation of all kinds; every kind of stimulus applied to the mouth, nose, and rectum; bleeding; heat, both by warm cloths, and warm water; blowing air into the windpipe; stimulants, such as blisters, warm ashes, &c. applied to the head, ankles, thighs, pit of the stomach, and other parts. Dr. Cullen's instructions are of more importance, but they are too long to admit even of abridgment here. For every practical purpose, the plan of recovery distributed by the Royal Humane Society, is sufficient. It is as follows:

Stripping and wrapping in blankets.

As soon as the patient is taken out of the water, the wet clothes, if the person is not naked at the time of the accident, should be taken off with all possible expedition on the spot (unless some convenient house is very near), and a great coat or two, or some blankets, if convenient, should be wrapped round the body.

Removal of the body.

The patient is to be then carefully conveyed in the arms of three or four men, to the nearest public or other house, where a good fire, if in the winter season, and a warm bed, can be ready for his reception. As the body is conveying to this place, great attention is to be paid to the position of the head; it must be kept supported in a natural and easy posture, and not suffered to hang down.

In removing it to a convenient place, care must be taken that it be not bruised, nor shaken violently, nor roughly handled, nor carried over any man's shoulders with the head hanging downwards, nor rolled upon the ground, nor over a barrel, nor lifted up by the heels; for experience proves that all these methods may be injurious, and destroy the small remains of life. If the unfortunate object cannot be cautiously conveyed by two or more persons, let him be placed in a carriage upon straw, lying as on a bed, with the head a little raised, and kept in as natural and easy position as possible.

Application of heat.

In cold or moist weather, the patient is to be laid on a mattrass or bed before the fire, but not too near, or in a moderately heated room; in warm and sultry weather, on a bed only. The body is then to be wrapped as expeditiously as possible with a blanket, and thoroughly dried with warm coarse cloths or flannels.

Should the accident happen in the neighborhood of a warm bath, brewhouse, bakehouse, glasshouse, or any place where warm lees, ashes, embers, grains, sand, water, &c. are easily procured, it would be of great importance to to place the body in any of these, moderated to a degree of heat little exceeding that of a healthy person: or in summer, the exposure to sunshine has been proved obviously beneficial. Friction with the hand, or with warm flannel or coarse cloth, so as not to injure the skin, should also be tried with perseverance, until more efficacious means can be tried.

Free circulation of fresh air.

In summer, or sultry weather, too much air cannot be admitted. For this reason it will be necessary to set open the windows and doors, as cool refreshing air is of the greatest importance in the process of resuscitation.

Number of assistants.

Not more than six persons are to be present to apply the proper means: a greater number will be useless, and may retard, or totally prevent the restoration of life, by rendering the air of the apartment unwholesome. It will be necessary therefore, to request the absence of those who attend merely from motives of curiosity.

Inflation of the lungs.

It will be proper for one of the assistants, with a pair of bellows of the common size, applying the pipe a little way up one nostril, to blow with some force, in order to introduce air into the lungs; at the same time the other nostril and the mouth are to be closed by another assistant, while a third person gently presses the chest with his hands, after the lungs are observed to be inflated. By pursuing this process, the noxious and stagnant vapours will be expelled, and natural breathing imitated. If the pipe of the bellows is too large, the air may be blown in at the mouth, the nostrils at the same time being closed, so that it may not escape that way; but the lungs are more easily filled, and natural breathing better imitated, by blowing up the nostrils.

Warm fomentations, &c.

Let the body be gently rubbed with flannels sprinkled with spirits. A warming pan heated (the body being surrounded with flannel) may be lightly moved up and down the back. Fomentations of hot brandy are to be applied to the pit of the stomach, loins, &c. and often renewed. Bottles filled with hot water, heated tiles covered with flannel, or hot bricks, may be efficaciously applied to the soles of the feet, palms of the hands, and other parts of the body. The temples may be rubbed with spirits of hartshorn, and the nostrils now and then tickled with a feather; and snuff, or eau de luce, should be occasionally applied.

Fumigations and clysters.

Tobacco fumes should be thrown up the fundament; if a fumigator is not at hand, a common pipe may answer the purpose.

The operation should be frequently performed, as it is of importance; for the good effects of this process have been experienced in a variety of instances of suspended animation. But should the application of tobacco smoke in this way not be immediately convenient, or other impediments arise, clysters of this herb, or other acrid infusions, with salt, &c. may be thrown up with advantage.

Warm bath.

When these means have been employed a considerable time without success, and a warm bath can be readily obtained, the body should be carefully conveyed to such a place, and remain in the bath, or surrounded with warm grains from a brew-house, for three or four hours. If a child has been drowned, its body should be wiped perfectly dry, and immediately placed in bed between two healthy persons. The salutary effects of the natural vital warmth conveyed in this manner, have been proved in a variety of successful cases.

Agitation.

While the various methods of treatment are employed, the body is to be shaken every ten minutes, in order to render the process of animation more successful; and children in particular, are to be much agitated, by taking hold of their legs and arms frequently, and for a continuance of time. In various instances, agitation has forwarded the recovery of boys who have been drowned and continued for a considerable time apparently dead.

Administration of cordials.

If there are any signs of returning life, such as sighing, gasping, or convulsive motions, a spoonful of any warm liquid may be given: and if the act of swallowing can be performed, a cordial of warm brandy or wine may be given in small quantities, and frequently repeated.

Electricity.

Electricity may be tried by the judicious and skilful, as its application neither prevents nor retards the various modes of recovery already recommended; but on the other hand, will most probably tend to render the other means employed more certainly and more expeditiously efficacious. This stimulus promises to prove an important auxiliary in cases of apparent death, and therefore deserves the serious regard and attention of the faculty. The electrical stroke should be given at first in a gentle degree, and afterwards gradually increased.

Bleeding, &c.

The methods which have been described, are to be employed with vigour for three hours or upwards, although no favourable circumstances should arise; for it is a vulgar and dangerous error to suppose that persons are irrecoverable, because life does not soon make its appearance; an opinion that has consigned to the grave an immense number of the seemingly dead, who might have been restored to life by resolution and perseverance. Bleeding is never to be employed in such cases, unless by direction of one of the medical assistants, or some other gentleman of the faculty, who has paid attention to the resuscitating art.

Excessive heat, or strokes of the sun.

Affections from this cause, which frequently occur in the West Indies and other warm climates, may be suspected, when a person exposed to the sun's rays, is seized with a violent head-ache, attended with throbbing or giddiness; followed with faintness and great insensibility, heat and dryness of the skin, redness of the eyes, difficulty of breathing; and according as the disease is more or less violent, with a difficulty, or entire inability of speaking or moving.

To guard against these dangerous effects of heat in warm climates, it will be proper to avoid labour or violent exercise, or exposure to the rays of the sun immediately after a hearty meal. To avoid drinking spirits of any kind. Small beer, vinegar, and water sweetened with sugar, or any thin cooling beverage, are alone proper for persons exposed to the excessive heat of the sun.

Should the symptoms increase, it will be proper to remove the affected person into a cool place, to open the garments, particularly about the neck and breast, and if the pulse beat forcibly, to bleed immediately,—the quantity proportioned to the strength of the pulse; but should the pulse be weak, bleeding must not be performed.

The feet and legs, and even the lower portion of the body, may be placed in cold water. Should, however, this process prove ineffectual, linen cloths wet with cold water, or water and vinegar, may be applied to the temples, and over the whole head; and draughts of vinegar and water, sweetened, may be freely drank. At all times, particular attention is to be paid to the state of the bowels.

Strokes of lightning.

When a person is struck by lightning, strip the body, and throw buckets full of cold water over it for ten or fifteen minutes; let continued frictions and inflations of the lungs be also practised; let gentle shocks of electricity be made to pass through the chest, when a skilful person can be procured to apply it; and apply blisters to the breast.

Intense cold.

Where the circulation and breathing is suspended from the exposure to cold, instead of carrying the body to the fire, or even into a warm room, it should at first be removed to an apartment without any fire. The clothes should be immediately taken off, and the whole body be well rubbed with snow, or washed in very cold water. When this has been continued for ten or fifteen minutes, we may restore the temperature of the body slowly, by using water made gradually warmer than the first, by repeated small additions of hot water to it.

In the mean time, the lungs should be diligently inflated in one or other of the methods already prescribed under the head of Drowning.

As soon as the circulation and breathing are restored, the patient should be laid between the blankets in bed, and particular care be taken, not to give him any strong or hot liquors, as these will readily excite a feverish state, accompanied, perhaps, with inflammation of some internal part, which may prove fatal. Weak wine whey, with the cold just taken off, will in general be a very proper drink, as it will tend to bring on a gentle perspiration, and thereby serve to prevent the danger just mentioned, when accompanied by hunger.

If the person, previous to his exposure to the cold, has been exhausted from want of food, a small piece of bread, sopped in the yolk of an egg beaten up with a little milk and sugar, and a tea-spoonful or two of brandy, or half a glass of wine added to it, should be given, and occasionally repeated until the patient's strength is so far recruited, as to admit of the cravings of appetite being gratified with safety.

By intoxication.

But if (as often happens) intoxication has had a considerable share in the business, an emetic or purgative clyster, given as soon as the pulse and breathing are re-established, will often assist in restoring the senses, and recruiting the strength: the propriety of this measure, however, will depend so much upon the circumstances of the case, that we could wish it to be always referred, where possible, to the judgment of a medical gentleman.

Treatment of frost bitten parts.

By exposure to extreme cold, the fingers, ears, toes, &c. are *frozen.* If, in such cases, artificial heat be too suddenly applied, mortification will ensue, and the *frost bitten* parts will spontaneously separate. Hence they ought to be thawed, either by rubbing them with snow, or immersing them in cold water, and afterwards applying warmth in the most careful and gradual manner; by which they will soon be restored to their usual tone and activity. Indeed (a popular writer justly observes) the great secret, or art of restoring suspended animation, consists in nicely adjusting the natural and artificial stimuli to the exact tone of the irritable fibre.

Sudden death.

When sudden death happens in the street, the nearest door should be opened immediately for the reception of the body. In all cases, interment should be deferred till signs of putrefaction appear, but especially in those where no *gradation of disease* has preceded, as in cases of hysterics, apoplexy, external injuries, drowning, suffocation, and the like. The effects of *sound* upon animal life is astonishing. The beat of a drum may have a very beneficial effect upon persons in a state of suspended animation. At one time, a scream, extorted by grief, proved the means of resuscitating a person who was supposed to be dead, and who had exhibited the usual recent marks of the extinction of life.

Cautions against premature interment.

In cases of malignant fevers, putrescency advances speedily, and, under such circumstances, the time of the funeral ought not to be unnecessarily protracted; but this ought never to be the case in northern climates, and in temperate or even cool weather. Young persons in the bloom of health and vigour, may be struck down by an illness of only a few days, or even hours, but they ought not to be consigned to the same summary sentence, merely because custom has ordained it. No sooner has breathing apparently ceased, and the visage assumed a ghastly or death-like look, than the patient, after his eyes are closed, is too often hurried into a coffin, and the body, scarcely yet cold, is precipitated into the grave. So extremely fallacious are the signs of death, that too often has the semblance been mistaken for the reality; especially after sudden accidents, or short illness. Many of these, however, by prompt means and judicious treatment, have been happily restored.

Unequivocal proofs of death should always be waited for, and every possible means of resuscitation persevered in when these do not appear, especially when we consider how appearances may be deceitful, and how unexpectedly the latent sparks of life may be rekindled. The following method was the means of restoring to her friends, a lady who had been apparently dead for some time.—Rub a wine glass with flannel before a fire, and immediately apply it to the mouth of the person supposed dead, when, if any of the vital principles remain, symptoms of moisture will appear in a short time on the glass.

USEFUL DOMESTIC MEDICINES.

Dover's sudorific powder.

Take of ipecacuanha in powder, opium (purified,) each 1 part, sulphate of potass, 8 parts. Triturate them together into a fine powder.

The sulphate of potass, from the grittiness of its crystals, is perhaps better fitted for tearing and dividing the tenacious opium than any other salt; this seems to be its only use in the preparation. The operator ought to be careful that the opium and ipecacuanha be equally diffused through the whole mass of powder, otherwise different portions of the powder must differ in degrees of strength.

This powder is one of the most certain sudorifics, and, as such, was recommended by Dr. Dover as an effectual remedy in rheumatism. Modern practice confirms its reputation, not only in rheumatism, but also in dropsy, and several other diseases, where it is often difficult, by other means, to procure copious perspiration. The dose is from 2 to 5 gr. repeated according as the patient's stomach and strength can bear it. It is proper to avoid much drinking immediately after taking it, otherwise it is very apt to be rejected by vomiting, before any other effects are produced. Perspiration should be kept up by diluents.

Emetic powder.

Take of ipecacuanha, in powder, ten grains, tartarized antimony, one grain.

Mix for an emetic powder, to be taken at seven in the evening, in a little tea or warm water. This is the ordinary dose for an adult.

Compound powder of chalk.

Take of prepared chalk, 1-2 a lb. cinnamon, 4 oz. tormentil, and gum arabic, each 3 oz. long pepper, 1-2 do. Powder them separately, and mix them.

This powder is used for weakness and acidity in the stomach; and in looseness from the same cause.

Aromatic powder.

Take of cinnamon bark, 1 ounce, lesser cardamom seeds, freed from husks, ginger, long pepper, each 1 ounce.

Rub them together to a powder, and preserve in a well-stopped phial.

This combination of aromatics is stimulant and carminative, and may be used to promote digestion, and dispel wind in cold phlegmatic habits, and decayed constitutions; but it is more generally employed to give warmth to other compositions. The dose is from 10 gr. to 1 scruple, given in the form of bolus, or diffused in water.

Aloetic powder with iron.

Take of socotrine aloes, powdered, 1 1-2 oz. myrrh, powdered, 2 ounces, extract of gentian and sulphate, each in powder, 1 ounce. Mix them.

In this powder we have an aloetic and chalybeate conjoined. It is an useful medicine, and is particularly employed in cases of obstructed mentruation.

Compound powder of Asarabacca.

Take of dried leaves of asarabacca, 1 oz.; lavender flowers and marjoram leaves dried, each 2 drachms. Rub them together to a powder, which keep in a well-stopped phial.

A few grains of this powder snuffed up the nostrils for several successive evenings, at bed-time, excite sneezing and a copious discharge of mucus, which continues to flow on the succeeding days. It has been particularly used in tooth-ache and chronic opthalmia.

Opiate, or Thebaic pills.

Take of purified storax, 3 drachms, soft purified opium, saffron, each, 1 dr. Beat them into an uniform mass.

The dose is 4 or 5 grains to be given at bedtime. This produces a very sound sleep, and without that disturbance which opium often creates.

Another preparation.

Take of purified storax, 8 grains, aromatic powder, 5 ditto, purified opium, 3 ditto, syrup of tolu, as much as is sufficient.

Make into 6 pills. Take one every night. This often produces less distress of the head and stomach, on the following morning, than opium by itself.

Compound assafœtida pills.

Take of assafœtida, galbanum, and myrrh, each 1 oz. rectified oil of amber, 1 drachm.

Beat them into a mass with simple syrup.

These pills are antihysteric and emmenagogue, and are very well calculated for answering those intentions; half a scruple, a scruple or more, may be taken every night, or oftener.

Compound aloetic pills.

Take of hepatic aloes, 1 oz. ginger powder, 1 drachm, soap, 1-2 oz. essential oil of peppermint, 1-2 a drachm.

Let the aloes and the ginger be rubbed well together, then add the soap and the oil so as form a mass.

These pills may be advantageously used for obviating the habitual costiveness of sedentary persons. The dose is from 10 to 15 grains.

Aloetic and myrrh pills.

Take of socotrine aloes, 4 drachms, myrrh, 2 drachms, saffron, 1 do. Beat them into a mass with simple syrup.

These pills have been long employed to stimulate and open the bowels in chlorotic, hypochondriacal, and long diseased habits. The dose is from 10 grains to a scruple, twice a day.

Plummer's pills.

These pills are alterative, diaphoretic, purgative, and beneficial in cutaneous eruptions, &c.

Take of calomel, 1 drachm, sulphate of antimony, 1 do. gum guaiacum, 2 drachms.

Mix these assiduously with mucilage, and divide into 60 pills, two pills forming the dose. To be taken at night.

Lady Webster's antibilious bills.

Take of socotrine aloes, 6 drachms, gum mastic, 2 drachms.

Reduce to powder separately; make into a mass with syrup of wormwood, and divide into 100 pills, of which take one every night.

Compound soap liniment.

Take of camphor, 1 oz. soap, 3 oz. spirit of rosemary, 1 pint.

Digest the soap in the spirit of rosemary until it be dissolved, and add to it the camphor. This is useful to excite action on the surface, and is used to disperse scrofulous enlargements, and to moisten flannel which is applied to the throat in cases of quinsey.

Steer's opodeldoc.

Dissolve 2 lbs. of white soap, and 1 lb. of yellow soap, in 3 pints of distilled water.

Now dissolve 4 oz. of camphor, 1 oz. of oil of rosemary, and 6 dr. of oil of origanum, in 3 pints of spirit of wine.

Mix both solutions, and then add 3 oz. of water of ammonia.

This liniment is extensively used to allay the inflammation of bruises, sprains, &c.

Gall-opodeldoc.

Dissolve 2 oz. of camphor, and 2 oz. of Castille soap, in 1-2 a pint of spirit of wine, in a wine-bottle.

Then add 1 oz. of laudanum, and 1 oz. of water of ammonia.

Now fill up the bottle with bullock's gall, previously made hot, and shake well. This is a well-known domestic liniment for bruises, &c.

Cajeput opodeldoc.

Take of almond soap, 2 oz. alcohol, 1 pint, camphor, 1 oz. cajeput oil, 2 oz.

First dissolve the soap and camphor in the alcohol in a retort, by means of a sand heat, and when the solution is about to congeal, or becomes nearly cold, add the oil of cajeput; shake them well together, and put it into bottles to congeal.

This composition is a great improvement on the opodeldocs in general use, and in cases of rheumatism, paralytic numbness, chilblains, enlargement of joints, and indolent tumours; where the object is to rouse the action of absorbent vessels, and to stimulate the nerves, it is a very valuable external remedy.

In several cases of lumbago and deep-seated rheumatic pains, it has been known to succeed in the almost immediate removal of the disease.

Liniment of ammonia.

Take of water of ammonia, 1-2 an oz. olive oil, 1 1-2 oz.

Shake them together in a phial till they are mixed.

In the inflammatory quinsey, a piece of flannel, moistened with this mixture, applied to the throat, and renewed every four or five hours, is one of the most efficacious remedies. By means of this warm stimulating application, the neck, and sometimes the whole body. is put into a sweat, which, after bleeding, either carries off or lessens the inflammation, Where the skin cannot bear the acrimony of this mixture, a larger proportion of oil may be used.

Liniment of lime water.

Take of lime water, and olive oil, each three ounces. Mix them by shaking in a phial.

This solution is thick, of a white colour, and devoid of acrimony. It is very advantageously applied to burns and scalds. The soapy matter separates from the water when it is kept for a little time, and therefore it is always better to prepare it only when it is wanted.

Eau de-luce.

Ten or twelve grains of white soap are dissolved in 4 oz. of rectified spirit of wine; after which the solution is strained. A drachm of rectified oil of amber is then added, and the whole filtered: with this solution should be mixed such a proportion of the strongest volatile spirit of ammonia, in a clear glass bottle, as will, when sufficiently shaken, produce a beautiful milk-white liquor. If a kind of cream should settle on the surface, it will be requisite to add a small quantity of the spirituous solution of soap. Those who may wish to have this liquor water perfumed, may employ lavender or Hungary water, instead of the spirit of wine.

This composition is, however, seldom obtained in a genuine state when purchased at the shops. Its use, as an external remedy, is very extensive: for it has not only been employed for curing the bites of vipers, wasps, bees, gnats, ants, and other insects, but also for burns, and even the bite of a mad dog, though not always with uniform success. Besides, it affords one of the safest stimulants in cases of suffocation from mephitic vapours, and in that state of apoplexy which is termed serous, as likewise after excessive intoxication, and in all those paralytic complaints where the vessels of the skin, or the muscular fibre require to be excited into action.

Another preparation.—Digest ten or twelve grains of the whitest pieces of mastic, selected for this purpose, and powdered, in two ounces of alcohol; and when nearly dissolved, add twenty grains of elemi. When both the resins are dissolved, add ten or fifteen drops of rectified oil of amber, and fifteen or twenty of essence of bergamot. Shake the whole well together, and let the grounds or fæces subside. The solution will be of a pale amber colour. It is to be added, in very small portions, to the best water of ammonia, until it assumes a milky whiteness, shaking the phial well after each addition. The strength and causticity of the ammonia are of the most essential consequence. If, upon the addition of the first drop or two of the tincture, a dense opake precipitate is formed, it is too strong and must be diluted with alcohol. A considerable proportion of the tincture, perhaps one to four, ought to be requisite to give the liquor the proper degree of opacity.

Riga balsam.

Mix together, 4 oz. spirit of wine, 1 dr. of Friar's balsam, 2 do. of tincture of saffron. This balsam is used for sprains and bruises.

Locatelli's balsam.

Melt together, in a glazed pipkin, 4 oz. of yellow wax, 1 lb. of common oil, 1 do. of Venice turpentine, 4 oz. of alkanet root, wrapt up in a linen bag.

Fomentations.

Fomentations are applied externally, and as warm as the patient can conveniently bear, in the following manner: Two flannel cloths are dipped into the heated liquor, one of which is wrung as dry as the necessary speed will admit, then immediately applied to the part affected. The flannel lies on, until the heat begins to go off, and the other is in readiness to apply at the instant in which the first is removed:—thus these flannels are alternately applied, so as to keep the affected part constantly warm. This is continued fifteen or twenty minutes, and repeated two or three times a day, or as often as occasion may require. The degree of heat should never exceed that of producing a pleasing sensation; great heat sometimes produces effects very opposite to that intended by the use of the fomentation.

Decoction for fomentations.

Take of the leaves of southernwood, dried, tops of sea-wormwood, do. chamomile flowers, do. each 1 oz. bay leaves, do. 1-2 oz. distilled water, 6 pints. Boil them a little, and strain.

In making these decoctions the aromatic substances should not be added until the decoction is nearly completed, for otherwise their flavour would be entirely dissipated.

As fomentations, their virtues depend, in a great measure upon the warm water, which relaxes as a bath; and when the herbs themselves are applied, they act only as retaining heat and moisture for a longer time, and operate on the mind of the patient; but are a less convenient, and hardly more useful fomentation, than cloths wrung out of hot water.

Anodyne fomentation.

Take two poppy heads, boil them in a quart of milk, and use this as a fomentation. It is excellent in inflamed eyes, also to relieve the pain of inflammation from a blister or other cause.

Mustard cataplasm.

Take of mustard seed, powdered, 1-2 lb. crumb of bread, 1-2 do. vinegar as much as is sufficient. Mix and make a cataplasm.

Cataplasms of this kind are commonly known by the name of sinapisms. They were formerly frequently prepared in a more complicated state, containing garlic, black soap, and other similar articles; but the above simple form will answer every purpose which they are capable of accomplishing. They are employed only as stimulants: they often inflame the part, and raise blisters, but not so perfectly as cantharides. They are frequently applied to the soles of the feet, in the low state of acute diseases, for raising the pulse and relieving the head. The chief advantage they have, depends on the suddenness of their action.

Simple ointment.

Take of olive oil, 5 oz. white wax, 2 oz. This is an useful emollient ointment for softening the skin.

Ointment of hog's lard.

Take of prepared hog's lard, 2 lbs. rose-water, 3 oz. Beat the lard with the rose-water until they be mixed: then melt the mixture with a slow fire, and set it apart that the water may subside; after which pour off the lard from the water, constantly stirring until it be cold.

This ointment may be used for softening the skin and healing chaps.

Wax ointment.

Take of white wax, 4 oz. spermaceti, 3 oz. olive oil, 1 pint. Mix them together over a gentle fire, and then stir them very briskly, without ceasing, till they are cold.

Spermaceti ointment.

Take of spermaceti, 6 dr. white wax, 2 do. olive oil, 3 oz. Melt all together over a gentle fire, stirring briskly, without intermission, till the ointment becomes cold.

These two ointments are supposed only to supple the parts, and hinder the rag or lint from sticking to the granulating flesh, and they also keep the air from wounds, which is known to irritate them, from the oxygen in the atmosphere; but they have, otherwise, no peculiar healing virtue.

Lip salve.

Melt together 2 1-2 oz. white wax, 3 oz. of spermaceti, 7 oz. oil of almonds, 1 dr. of balsam of Peru, and 1 1-2 oz. of alkanet root, wrapped up in a linen bag.

Pour the salve into small gallipots or boxes, and cover with bladder and white leather.

Basilicon, or yellow resinous ointment.

Take of yellow rosin, 1 lb. yellow wax, 1 do. olive oil, 1 pint. Melt the rosin and wax with a gentle heat; then add the oil, and strain the mixture while yet warm.

This plaister is employed for the dressing broken chilblains, and other sores that require stimulating; it is also used to drive milk away, being placed over the tumid breasts when the child is weaned.

Turner's cerate.

This ointment is known by the vulgar name of Turner's Cerate, as curing the wounds of Turners. It is generally used for broken chilblains.

Take of prepared calamine, yellow wax, each 1-2 lb. olive oil, 1 pint.

Melt the wax with the oil, and as soon as they begin to thicken, sprinkle in the prepared calamine and keep it stirring till the cerate is cool.

Cerussa ointment.

Take of ointment of white wax, 1 lb. cerussa, or white lead reduced to fine powder, 2 oz. Form them into an ointment, by melting over a gentle fire.

This is an useful, cooling, desiccative ointment, chiefly employed as a dressing for burns.

Savin ointment.

Take of fresh savin leaves, separated from the stalks, and bruised, 1-2 lb. prepared hog's lard, 2 lbs. yellow wax, 1-2 lb. Boil the leaves in the lard until they become crisp; then filter with expression; lastly, add the wax, and melt them together.

This is an excellent issue ointment, being, in many respects, preferable to those of cantharides. It is mixed with equal parts of blistering ointment, in order to keep up a discharge.

Mercurial ointment.

Take of mercury, and mutton suet, each 1 part; hog's lard, 3 parts. Rub the mercury diligently in a mortar with a little of the hog's lard, until the globules disappear; then add the remainder of the lard, and rub until the ointment is completely prepared.

One drachm of this ointment contains twelve grains of mercury.

The preparation of mercurial ointment requires much labour, care, and patience. During the trituration, the mercury is mechanically divided into minute globules, which are prevented from running together again by the viscosity of the fat. These globules at length disappear, being oxidized, or rendered black by intimate mixture with the lard. Whatever tends to favour this, (for instance, a slight degree of rancidity of the lard,) shortens the time, and lessens the labour required for the preparation of the ointment. It is not uncommon, however, to use other means, which are not admissible, to facilitate the process, such as the use of sulphur or turpentine. The first may be detected by the very black colour of the ointment, and also by the sulphurous odour exhaled when a paper covered with a little of it is held over the flame of a candle. The turpentine is detected by its odour also, when the ointment containing it is treated in the same manner.

When newly prepared, mercurial ointment has a light grey or blueish colour, owing to its containing some unoxidized metal, which separates in globules when it is liquefied by a gentle heat; when kept for some time, the colour is much deepened, and less metallic mercury is seen, owing to the more complete oxidizement of the metal.

Cerate of Spanish flies.

Take of cerate of spermaceti, softened with heat, six drachms; Spanish flies, finely powdered, one drachm. Mix them by melting over a gentle fire.

Under this form, cantharides may be made to act to any extent that is requisite. It may supply the place either of the blistering plaister or ointment; and there are cases in which it is preferable to either. It is, particularly, more convenient than the plaister of cantharides, where the skin to which the blister is to be applied, is previously much affected, as in cases of small-pox: and in supporting a drain under the form of issue, it is less apt to spread than the softer ointment.

Plaister of Spanish flies.

Take of Spanish flies, 1 lb. wax plaister, 2 lbs. prepared hog's lard, 1-2 lb.

Having melted the plaister and lard, a little before they coagulate, sprinkle in the flies, reduced to a very fine powder.

Cantharides of good quality, duly applied to the skin, never fail of producing *blisters.* When, therefore, the desired effect does not take place, it is to be ascribed to flies either being faulty at first, or having their activity afterwards destroyed by some accidental circumstance; such as too great heat in forming or spreading the plaister. The pain of blistering plaisters may be considerably diminished by the addition of a portion of opium, without preventing the good effects otherwise to be derived from them.

Compound blistering plaister.

Take of Burgundy pitch, Venice turpentine, and cantharides, each 12 parts, yellow wax, 4 parts, sub-acetate of copper, 2 parts, mustard-seed, and black pepper, each 1 part.

Having first melted the pitch and wax, add the turpentine, and to these, in fusion, and still hot, add the other ingredients, reduced to a fine powder, and mixed. Now stir the whole carefully together, so as to form a plaister.

This is the most infallible blistering plaister: for where a quick action is required it is a better form than the ordinary blister, but less suited for very irritable skins, or for children.

Compound Burgundy pitch plaister.

Take of Burgundy pitch, 2 lbs. labdanum, 1 lb. yellow resin, and yellow wax, each 4 oz. expressed oil of mace, 1 oz.

To the pitch, resin, and wax melted together, add first the labdanum, and then the oil of mace.

After a long continued *cough* in the winter, a Burgundy pitch plaister should be put over the breast bone.

Compound labdanum plaister.

Take of labdanum, 3 oz. frankincense, 1 oz. cinnamon, powdered, expressed oil of mace, each 1-2 oz. essential oil of mint, 1 dr.

To the melted frankincense add first the labdanum, softened by heat, then the oil of mace. Mix these afterwards with the cinnamon and oil of mint, and beat them together, in a warm mortar, into a plaister. Let it be kept in a close vessel.

This has been considered as a very elegant *stomach plaister*. It is contrived so as to be easily made occasionally (for these kinds of compositions on account of their volatile ingredients are not fit for keeping,) and to be but moderately adhesive, so as not to offend the skin, also that it may, without difficulty, be frequently renewed; which these applications, in order to their producing any considerable effect, require to be. They keep up a *perspiration* over the part affected, and create a local action, which diverts inflammation; *consumption* from colds, in delicate habits, is by such means frequently obviated.

Adhesive plaisters.

Take of common, or litharge plaister, 5 parts, white resin, 1 part.

Melt them together, and spread the liquid compound thin, on strips of linen, by means of a spatula, or table-knife.

This plaister is very adhesive, and is used for keeping on other dressings, &c.

Court plaister.

Bruise a sufficient quantity of fish glue, and let it soak for twenty-four hours in a little warm water; expose it to heat over the fire, to dissipate the greater part of the water, and supply its place by colourless brandy, which will mix the gelatine of the glue. Strain the whole through a piece of open linen; on cooling, it will form a trembling jelly.

Now extend a piece of black silk on a wooden frame, and fix it in that position by means of tacks, or pack-thread. Then with a brush made of badger's hair, apply the glue, after it has been exposed to a gentle heat to render it liquid. When this stratum is dry, which will soon be the case, apply a second, and then a third, if necessary, to give the plaister a certain thickness, as soon as the whole is dry, cover it with two or three strata of a strong tincture of balsam of Peru.

This is the real English court plaister: it is pliable, and never breaks, characters which distinguish it from so many other preparations sold under the same name.

Application.

This plaister is generally used to cover slight abrasions and excoriations of the skin. When used for small cuts, from sharp instruments, bring the lips of the wound together, and lay over it a piece of goldbeater's skin; then fix this by means of a piece of court plaister. The wound will generally heal, without further trouble.

Tincture of rhubarb.

Take of rhubarb sliced, 3 oz. lesser cardamom seeds, bruised, 1-2 do. liquorice root, bruised, 1-2 oz. saffron, 2 dr. proof spirit of wine, 2 pints.

Digest for 7 days, and strain. Dose 1-2 an oz. as a purge, or 2 dr. as a *stomachic.*

Compound tincture of rhubarb.

Take of rhubarb, sliced, 2 oz. liquorice root, bruised, 1-2 oz. ginger, powdered, saffron, each 2 dr. distilled water, 1 pint, proof spirit of wine, 12 oz. by measure.

Digest for 14 days, and strain. Dose, 1-2 an oz. as an *aperient*, or 1 oz. in violent diarhœa.

Tincture of ginger.

Take of ginger, in coarse powder, 2 ounces, proof spirit, 2 pints.

Digest in a gentle heat, for 7 days, and strain.

This tincture is *cordial* and *stimulant*, and is generally employed as a corrective to purgative draughts.

Tincture of cinnamon.

Take of cinnamon, bruised, 1 1-2 oz. proof spirit of wine, 1 pint. Digest for 7 days and strain.

The tincture of cinnamon possesses the astringent virtues of the cinnamon, as well as its aromatic cordial ones; and in this respect it differs from the spirit prepared by distillation.

This is added to cover the taste of drugs, and as a *cordial adjunct*, in the dose of 2 dr.

Aromomatic tincture, or compound tincture of cinnamon.

Take of cinnamon bruised, lesser cardamom seeds, each 1 oz. long pepper, in powder, 2 drachms, diluted alcohol, 2 1-2 lbs.

Digest for seven days and filter through paper.

In their formula, the Dublin and London Colleges diminish the quantity of cardamom seeds, and substitute for it a proportion of ginger. This makes no alteration in the virtues of the preparation, which is a very warm aromatic, too hot to be given without dilution. A tea-spoonful or two may be taken in wine, or any other convenient vehicle in languors, weakness of the stomach, flatulencies and other similar complaints; and in these cases it is often employed with advantage. Like the last, it is an useful adjunct to medicines, especially aperient medicines, or those called stomachics, and is generally ordered in the quantity of 2 drachms.

Compound tincture of aloes.

Take of tincture of myrrh, 2 pints, saffron, and socotrine aloes, each 3 oz. Digest for eight days, and strain.

This medicine is highly recommended, and not undeservedly as a warm stimulant and aperient. It strengthens the stomach and other viscera, cleanses the first passages from tenacious phlegm, and promotes the natural secretions in general. Its continued use has frequently done much service in uterine obstructions, and other similar disorders; particularly in cold pale phlegmatic habits. Where the patient is of a hot bilious constitution and florid complexion, this warm stimulating medicine is less proper, and sometimes prejudicial. The dose may be from 20 drops to a tea spoonful or more, two or three times a day, according to the purposes which it is intended to answer.

Compound tincture of senna.

Take of senna leaves, 2 oz. jalap root, 1 oz. coriander seeds, 1-2 oz. proof spirit, 2 1-2 pints.

Digest for seven days, and to the strained liquor add 4 ounces of sugar candy.

This tincture is an useful carminative, and cathartic, especially to those who have accustomed themselves to the use of spirituous liquors; it often relieves flatulent complaints and colics, where the common cordials have little effect; the dose is from 1 to 2 ounces, It is a very useful addition to the castor oil, in order to take off its mawkish taste; and, as coinciding with the virtues of the oil, it is therefore much preferable to brandy, shrub, and such like liquors, which otherwise are often found necessary to make the oil sit on the stomach.

Daffy's elixir.

Take of senna, 2 lbs. rhubarb shavings, 2 lbs. jalap root, 1 lb. caraway seeds, 1 lb. aniseeds, 2 lbs. sugar 4 lbs. shavings of red sanders wood, 1-2 lb.

Digest these in 10 gallons of spirit of wine, for 14 days, and strain for use.

This elixir possesses almost the same qualities as the Compound Tincture of Senna. The above quantities may be reduced to as small a scale as may be required.

The black drop.

The following account of the origin and composition of this well-known medicine, is taken from Dr. Armstrong's Work on Typhus Fever.

"The black drop was originally prepared upwards of one hundred years ago, by Edward Toustall, a medical practitioner, in the country of Durham, and one of the Society of Friends. The recipe passing into the possession of a near relative, John Walton of Shildon, was found among his brother's papers, and by the permission of Thomas Richardson, of Bishop's Wearmouth, one of his executors, it is here inserted.

"Take half a pound of opium, sliced, three pints of good verjuice, one and a half an oz. of saffron; boil them to a proper thickness, then add a quarter of a pound of sugar and two spoonsful of yeast. Set the whole in a warm place, near the fire, for six or eight weeks, then place it in the open air until it becomes of the consistence of a syrup; lastly, decant, filter, and bottle it up, adding a little sugar to each bottle."

The above ingredients ought to yield, when properly made, about two pints of strained liquor.

Godfrey's cordial.

Dissolve 1-2 an oz. of opium, 1 drachm of oil of sassafras, in 2 ounces of spirits of wine. Now mix 4 lbs. of treacle, with 1 gallon of boiling water, and when cold, mix both solutions. This is generally used to soothe the *pains of children*, &c.

Balsam of honey.

Take of balsam of Tolu, 2 oz. gum storax, 2 drachms, opium, 2 do. honey, 8 oz. Dissolve these in a quart of spirit of wine.

This balsam is exceedingly useful in allaying the irritation of *cough*. The dose is 1 or 2 tea-spoonsful in a little tea, or warm water.

Tincture of the balsam of Tolu.

Take of balsam of Tolu, 1 oz. alcohol, 1 pint. Digest until the balsam be dissolved, and then strain the tincture through a paper.

This solution of the balsam of Tolu possesses all the virtues of the balsam itself. It may be taken internally, with the several intentions for which that balsam is proper, to the quantity of a tea-spoonful or two, in any convenient vehicle.

Mixed with simple syrup, it forms an agreeable balsamic syrup.

Tincture of Peruvian bark.

Take of Peruvian bark, 4 oz. proof spirit, 2 pints. Digest for ten days, and strain.

It may be given from a tea-spoonful to 1-2 an ounce, or an ounce, according to the different purposes it is intended to answer.

Huxham's tincture of bark.

Take of Peruvian bark, powdered, 2 oz. the peel of Seville oranges, dried, 1 1-2 do. Virginian snake root, bruised, 3 drachms, saffron, 1 do. cochineal, powdered, 2 scruples, proof spirit, 20 oz. Digest for fourteen days, and strain.

As a *corroborant* and *stomachic*, it is given in doses of two or three drachms; but when employed for the cure of intermittent fevers, it must be taken to a greater extent.

Dr. Whyte's tincture of bark.

Take of Peruvian bark, 4 oz. gentian root, and orange peel, each 1 oz. brandy, 2 pints. Digest for fourteen days, and strain. The qualities are nearly the same as the foregoing, and the dose from 4 to 8 drachms.

Tincture of guaiacum.

Take of guaiacum, 4 ounces, rectified spirit of wine, 2 pints. Digest for seven days, and filter.

What is called gum guaiacum is, in fact, a resin, and perfectly soluble in alcohol. This solution is a powerful stimulating sudorific, and may be given in doses of about 1-2 an ounce in rheumatic and asthmatic cases.

Ammoniated tincture of guaiacum.

Take of resin of guaiacum, in powder, 4 oz. ammoniated alcohol, in powder, 1 1-2 lbs. Digest for seven days, and filter through a paper.

This is a very elegant and efficacious tincture: the ammoniated spirit readily dissolving the resin, and, at the same time, promoting its medical virtues. In rheumatic cases, a tea, or even table-spoonful, taken every morning and evening, in any convenient vehicle, particularly in milk, has proved of singular service.

Compound tincture of benzoin.

Take of benzoin, 3 oz. purified storax, 2 oz. balsam of Tolu, 1 oz. socotrine aloes, 1-2 an oz. rectified spirit of wine, 2 pints. Digest for seven days, and filter.

This preparation may be considered as an elegant simplification of some very complicated compositions, which were celebrated under different names; such as Baume de Commandeur, Wade's Balsam, Friar's Balsam, Jesuits' Drops, &c. These, in general, consisted of a confused farrago of discordant substances. The dose is a tea-spoonful in some warm water four times a day, in consumptions and spitting of blood. It is useful, also, when applied on lint, to recent wounds, and serves the purpose of a scab, but must not be soon removed. Poured on sugar it removes spitting of blood immediately.

Tincture of catechu.

Take of extract of catechu, 3 oz. cinnamon, bruised, 2 oz. diluted alcohol, 2 pints. Digest for seven days, and strain through paper.

The cinnamon is a very useful addition to the catechu, not only as it warms the stomach, but likewise as it covers its roughness and astringency.

This tincture is of service in all kinds of defluxions, catarrhs, loosenesses, and other disorders where astringent medicines are indicated. Two or three tea-spoonsful may be taken every now and then, in red wine, or any other proper vehicle.

Godbold's vegetable balsam.

A pound of sugar-candy, dissolved by heat in a quantity of white wine vinegar, and evaporated to the measure of 1 pint, during which operation as much garlic as possible is dissolved with it, answers all the purposes of Godbold's Vegetable Balsam, and is probably the same medicine.

Ipecacuanha wine.

Take of the root of ipecacuanha, bruised, 2 oz. Spanish white wine, 2 pints. Digest for ten days, and strain.

This wine is a very mild and safe emetic, and nearly equally serviceable in dysenteries, with the ipecacuanha in a substance; this root yielding nearly all its virtues to the Spanish white wine. The common dose is an ounce, more or less, according to the age and strength of the patient.

Spirit of nutmeg.

Take of bruised nutmeg, 2 oz. proof spirit, 1 gallon, water sufficient to prevent burning. Distil off a gallon.

This is used to take off the bad flavour of medicine, and is a grateful cordial.

Spirit of lavender.

From 2 pounds of the flowering spikes of lavender, according to the Edingburgh College, and from a pound and a half according to the London, this spirit is to be formed. It is used as an analeptic perfume; also, taken inwardly, in case of fainting, from a drachm to half an ounce.

Lavender water.

The common mode of preparing this is to put 3 drachms of the essential oil of lavender, and a drachm of the essence of ambergris, into 1 pint of spirit of wine.

Spirit of rosemary.

Take of the fresh tops of rosemary, 1 1-2 lbs. proof spirit, 1 gallon. Distil off in a water bath, 5 pints.

This is useful as an outward application for strains and bruises, and, given internally, cured a Queen of Hungary of a paralytic affection.

Compound spirit of aniseed.

Take of aniseed, angelica-seed, each, bruised, 1-2 lb. proof spirit, 1 gallon, water sufficient to prevent a bad taste or flavour. Draw off one gallon by distillation.

This compound is often employed with advantage, in cases of flatulent colic; but it has been alleged to be sometimes too frequently used with this intention, especially by old ladies. Unless it be prudently employed, it may soon be attended with all the pernicious consequences of dram drinking.

Water of pure ammonia.

Take of sal-ammoniac, 1 lb. quicklime, 2 lbs. water, 1 gallon. Add to the lime two pints of the water. Let them stand together an hour; than add the sal-ammoniac and the other six pints of water boiling, and immediately cover the vessel. Pour out the liquor when cold, and distil off, with a slow fire, one pint. This spirit is too acrimonious for internal use, and has therefore been chiefly employed for smelling to, in fainting, &c. though, when properly diluted, it may be given inwardly with safety.

Water of acetated ammonia.

Take of ammonia, by weight, 2 oz. distilled vinegar, 4 pints; or as much as is sufficient to saturate the ammonia.

This is an excellent aperient saline liquor. Taken warm in bed, it proves commonly a powerful sudorific; and as it operates without heat, it is used in febrile and inflammatory disorders, where medicines of the warm kind, if they fail of procuring sweat, aggravate the distemper. Its action may likewise be determined to the kidneys, by walking about in cool air. The common dose is half an ounce, either by itself, or along with other medicines adapted to the intention. Its strength is not a little precarious, depending on that of the vinegar.

Conserve of sloes.

Put the sloes in water upon the fire, that they may soften, taking care that they be not broken; then take them out of the water, press out the pulp and mix it, with three times it weight of double refined sugar into a conserve.

This preparation is a gentle astringent, and may be given as such in the dose of two or three drachms. It is used also for a gargle with considerable advantage, especially where the uvula is found to be relaxed.

Opiate electuary.

Take of aromatic powder, 6 oz. Virginian snake-root in fine powder, 3 oz. opium, diffused in a sufficient quantity of Spanish white wine, 1-4 oz. syrup of ginger, 1 lb. Mix, so as to make an electuary.

The operation of the opium, which is the most important ingredient in the above preparation, is modified by the aromatics. This electuary is a stimulant narcotic, and is usefully employed in atonic gout, flatulent colic, and in diarrhœas unattended by any inflammatory symptoms. The dose is from 10 to 15 grains given in the form of bolus, or diffused in chalk mixture.

Black pectoral lozenges.

Take of extract of liquorice, gum-arabic, each, 4 oz. white sugar, 8 oz.

Dissolve them in warm water, and strain: then evaporate the mixture over a gentle fire till it be of a proper consistence for being formed into lozenges, which are to be cut out of any shape.

White pectoral lozenges.

Take of fine sugar, 1 lb. gum arabic, 4 ounces, starch, 1 oz. flowers of benzoin, 3-4 drachm.

Having beat them all in a powder, make them into a proper mass with rose-water, so as to form lozenges.

These compositions are very agreeable pectorals, and may be used at pleasure. They are calculated for softening acrimonious humours, and allaying the tickling in the throat which provokes coughing.

Nitre lozenges.

Take of nitre, purified, 3 oz. double refined sugar, 9 oz.

Make them into lozenges with mucilage of gum tragacanth.

This is a very agreeable form for the exhibition of nitre as a diuretic or febrifuge, though, when the salt is thus taken without any liquid (if the quantity be considerable), it is apt to occasion uneasiness about the stomach, which can only be prevented by a large dilution with aqueous liquors. The nitre lozenges have been employed, with success, in some cases of difficult deglutition.

Honey of roses.

Take of dried red rose-buds, 4 oz. boiling distilled water, 3 pints; clarified honey, 5 lbs. Macerate the rose leaves in the water for six hours; then mix the honey with the strained liquor, and boil the mixture to the thickness of a syrup.

This preparation is not unfrequently used as a mild, cooling detergent, particularly in gargles for ulcerations and inflammation of the mouth and tonsils. The rose buds here used should be hastily dried, that they may the better preserve their astringency.

Syrup of ginger.

Take of ginger bruised, 4 oz. boiling distilled water, 3 pints.

Macerate four hours, and strain the liquor; then add double refined sugar, and make into a syrup.

This syrup promotes the circulation through the extreme vessels; it is to be given in torpid and phlegmatic habits, where the stomach is subject to be loaded with slime, and the bowels distended with flatulency. Hence it enters into the compound tincture of cinnamon and the aromatic powder.

Dyspeptic patients, from hard drinking, and those subject to flatulency and gout, have been known to receive considerable benefit by the use of ginger tea, taking two or three cupsful for breakfast, suiting it to their palate.

Syrup of poppies.

Take of the heads of white poppies, dried, 3 1-2 lbs. double refined sugar, 6 lbs. distilled water, 8 gallons.

Slice and bruise the heads, then boil them in the water to three gallons, and press out the decoction. Reduce this, by boiling to about 4 pints, and strain it while hot through a sieve, then through a thin woollen cloth and set it aside for 12 hours, that the grounds may subside. Boil the liquor poured off from the grounds to 3 pints, and dissolve the sugar in it, that it may be made a syrup.

This syrup, impregnated with the narcotic matter of the poppy-head, is given to children in doses of two or three drachms, and to adults of from 1-2 an ounce, to one ounce and upwards, for easing pain, procuring rest, and answering the other intentions of mild operations. Particular care is requisite in its preparation, that it may be always made, as nearly as possible, of the same strength.

Syrup of violets.

Take of fresh flowers of the violet, 1 lb. boiling distilled water, 3 pints.

Macerate for 25 hours, and strain the liquor through a cloth, without pressing, and add double refined sugar, to make the syrup. This is an agreeable laxative medicine for young children.

Syrup of squills.

Take of vinegar of squills, 2 lbs. double refined sugar, in powder, 3 1-2 lbs.

Dissolve the sugar with a gentle heat, so as to form a syrup.

This syrup is used chiefly in doses of a spoonful or two for promoting expectoration, which it does very powerfully. It is also given as an emetic to children.

Oxymels of squills.

Take of clarified honey, 3 lbs. vinegar of squills, 2 pints.

Boil them in a glass vessel, with a slow fire, to the thickness of a syrup.

Oxymel of squills is an useful aperient, detergent, and expectorant, and of great service in humoral asthmas, coughs, and other disorders where thick phlegm abounds. It is given in doses of two or three drachms, along with some aromatic water, as that of cinnamon, to prevent the great nausea which it would otherwise be apt to excite. In large doses it proves emetic.

Vinegar of squills.

Take of squills, recently dried, 1 lb. vinegar, 6 pints, proof spirit, 1-2 pint.

Macerate the squills with the vinegar, in a glass vessel, with a gentle heat, for twenty-four hours; then express the liquor, and set it aside until the fæces subside. To the decanted liquor add the spirit.

Vinegar of squills is a medicine of great antiquity. It is a very powerful stimulant; and hence it is frequently used with great success as a diuretic and expectorant. The dose of this medicine is from a drachm to half an ounce: where crudities abound in the first passages, it may be given at first in a larger dose, to evacuate them by vomiting. It is most conveniently exhibited along with cinnamon, or other agreeable aromatic waters, which prevent the nausea it would otherwise, even in small doses, be apt to occasion.

Vegetable extracts.

Dr. Richman, of St. Petersburg, communicated the following method of making extracts, by Professor Janish, of Moscow, and pledges the efficacy of those so prepared. The expressed juice of vegetables is to be put in a dish, which is to be placed under the receiver of an air pump; over this is to be placed another, containing well-burnt muriate of lime, and so on several alternate layers. As the air is exhausted, the water evaporates, and is immediately re-absorbed, by the lime leaving the dry extract unchanged. The temperature employed should not exceed fourteen degrees of Reaumur.

Professor Janish has made some alterations in the air pump, to make it answer his purpose better; amongst others, a contrivance by which the evaporated fluid collects in a recipient surrounded with ice. Extracts thus prepared, rubbed down with twelve parts of water, exhibit the juice of vegetables with all their properties.—*Saltzburg Med. and Lit. Zeitung*, 1818.

Tar-water.

Take of tar, 2 pints, water, 1 gallon. Mix, by stirring them with a wooden rod for a quarter of an hour, and, after the tar has subsided, strain the liquor, and keep it in well-corked phials.

Tar-water should have the colour of white wine, and an empyreumatic taste. It is, in fact, a solution of empyreumatic oil, effected by means of acetous acid. It acts as a stimulant, raising the pulse, and increasing the discharge by the skin and kidneys. It may be drank to the extent of a pint or two in the course of a day.

Decoction of sarsaparilla.

Take of sarsaparilla root, cut, 6 ounces, distilled water, 8 pints.

After macerating for two hours, with a heat about 195 degrees, then take out the root, and bruise it; add it again to the liquor, and macerate it for two hours longer; then boil down the liquor to 4 pints, and strain it. The dose is from 4 ounces, to half a pint, or more, daily.

Compound decoction of sarsaparilla.

Take of sarsaparilla root, cut and bruised, 6 ounces, the bark of sassafras root, the shavings of guaiacum wood, liquorice root, each 1 ounce, the bark of mezereon root, 3 drachms, distilled water, 10 pints.

Digest with a gentle heat for 6 hours, then boil down the liquor to one half, (or five pints) adding the bark of the mezereon root towards the end of boiling. Strain off the liquor. The dose is the same as the last, and for the same purposes.

These decoctions are of very great use in purifying the blood, and resolving obstruction in scorbutic and scrofulous cases, also in cutaneous eruptions, and many other diseases. Obstinate swellings, that had resisted the effect of other remedies for above twelve months, have been cured by drinking a quart of decoction of this kind, daily, for some weeks. Decoctions of sarsaparilla ought to be made fresh every day, for they very soon become fœtid, and unfit for use, sometimes in less than twenty-four hours, in warm weather.

Decoction of the woods.

Take of guaiacum raspings, 3 ounces, raisins, stoned, 2 ounces, sassafras root, sliced, liquorice root, bruised, each 1 ounce, water, 10 lbs.

Boil the guaiacum and raisins with the water, over a gentle fire, to the consumption of one half, adding, towards the end, the sassafras and liquorice, and strain the decoction without expression.

This decoction is of use in some rheumatic and cutaneous affections. It may be taken by itself, to the quantity of a quarter of a pint, twice or thrice a day, or used as an assistant in a course of mercurial or antimonial alteratives; the patient in either case keeping warm, in order to promote the operation of the medicine.

Compound infusion of spearmint.

Take of the leaves of spearmint, dried, 2 drachms, boiling water as much as will afford 6 ounces of the infusion when filtered. Digest for half an hour, in a covered vessel; strain the liquor, when cold, and then add—

Of double refined sugar, 2 dr. oil of spearmint, 3 drops, dissolved in compound tincture of cardamoms, 1-2 oz. Mix.

This infusion is slightly stimulating and diaphoretic, and forms a very agreeable herb tea, which may be used in any quantity, in diet, or as a vehicle for more active remedies.

Infusion of catechu.

Take of extract of catechu, in powder, 2 1-2 dr. cinnamon, bruised, 1-2 dr. boiling water, 7 ounces, simple syrup, 1 ounce.

Macerate the extract and cinnamon in the water, in a covered vessel, for 2 hours, then strain it, and add the syrup.

As this preparation will not keep above a day or two, it must always be made extemporaneously. The two hours' maceratisn, therefore, becomes very often extremely inconvenient; but it may be prepared in a few minutes by boiling, without in the least injuring the virtues of the medicine.

This infusion is a powerfully astringent solution. The cinnamon and syrup render it sufficiently agreeable, and it will be found serviceable in diarrhœas proceeding from a laxity in the intestines. Its dose is a spoonful or two every other hour, or after every loose stool.

Infusion of roses.

Take of dried red roses, 1 2 ounce, diluted vitriolic acid, 3 drachms, boiling distilled water, 2 1-2 pints, double-refined sugar, 1 1-2 ounces.

First pour the water on the petals, in a close vessel, then add the diluted vitriolic acid, and macerate for half an hour. Strain the liquor when cold, and add the sugar.

The differences in the directions for preparing this infusion are very material. In fact, the rose leaves have very little effect, except in giving the mixture an elegant red colour. Its sub-acid and astringent virtues depend entirely on the sulphuric acid. Altogether, however, it is an elegant medicine, and forms a very grateful addition to juleps in hæmorrhages, and in all cases which require mild coolers and sub-astringents. It is sometimes taken with boluses or electuaries of bark, and likewise makes a good gargle.

Compound juice of scurvy grass.

Take of juice of garden scurvy-grass, 2 pints, brook lime, water-cresses, each 1 pint, Seville oranges, 20 ounces, by measure.

Mix them, and, after the fæces have subsided, pour off the liquor, or strain it.

This composition is of considerable use for the purposes expressed in the name: the orange-juice is an excellent assistant to the scurvy-grass, and other acrid antiscorbutics, which, when thus mixed, have been found, from experience, to produce much better effects than when employed by themselves. They may be taken in doses, from an ounce or two to a quarter of a pint, two or three times a day; they generally increase the urinary secretions, and sometimes induce a laxative habit.

We have the testimony of its great use in scurvy, not only by physicians, but navigators, as Anson, Linscoten, Maaertens, Egede, and others. Forster found it in abundance in the South Sea islands.

Emetic draught.

Take of ipecacuanha wine, 7 drachms, antimonial wine, 1 do. syrup of violets, 1 do. rose-water, 3 do.

Make into a draught to be taken at 8 in the evening; or, for an infant, give a tea-spoonful every 5 minutes until it operates, and half of it for a child of 10 or 12 years. It has no taste.

Mild aperient draughts.

Take senna leaves an ounce and a half, ginger sliced, 1 drachm, boiling water, 1 pint. Macerate for an hour, and strain the liquor.

Two or three tea-spoonsful of Epsom salts dissolved in a wine-glassful of warm water, with 3 table-spoonsful of the above infusion of senna, and a tea-spoonful of tincture of senna, or cardamoms, will act as a mild aperient. It should be taken early in the morning, and a plentiful supply of tea, afterwards, at breakfast.

Mild purgative for infants.

Take of manna, 1 ounce, mucilage of gum arabic, oil of almonds, syrup of lemons, each 2 dr. Of this mixture give a tea-spoonful to a child at bed-time.

Camphor mixture.

Take of camphor, 1 drachm, rectified spirit of wine, ten drops, double refined sugar, half an ounce, boiling distilled water, one pint.

Rub the camphor first with the spirit of wine, then with the sugar; lastly, add the water by degrees, and strain the mixture.

In the common form of camphor emulsion the union is effected, by triturating the camphor with a few almonds, the unctuous quality of which serves in a considerable degree, to cover the pungency of the camphor without diminishing its activity. Camphor under the present form, as well as that of emulsion, is very useful in fevers taken to the extent of a table-spoonful every three or four hours.

Chalk mixture.

Take of prepared chalk, 1 oz. refined sugar, 1-2 an oz. mucilage of gum arabic, 2 oz. Rub them together and then add by degrees, water, 2 pints, spirituous cinnamon water, 2 oz.

This is a very elegant form of exhibiting chalk, and is an useful remedy in diseases arising from, or accompanied with, acidity in the stomach, &c. It is frequently employed in diarrhœa proceeding from that cause. The mucilage not only serves to keep the chalk uniformly diffused, but also improves its virtues by sheathing the internal surface of the intestines. The dose of this medicine requires no nicety. It may be taken to the extent of a pint or two in the course of a day.

Ammoniacum milk, &c.

Take of gum ammoniac, 2 drachms, distilled water, half a pint.

Rub the gum resin with the water, gradually poured on, until it becomes a milk.—In the same manner may be made a milk of assafœtida, and of the rest of the gum resins.

The ammoniacum milk is used for softening tough phlegm, and promoting expectoration, in humoral asthmas, coughs, and obstructions of the viscera. It may be given in the quantity of two spoonsful twice day.

The milk of assafœtida is employed in spasmodical, hysterical, and other nervous affections; and it is not unfrequently used under the form of clyster. It answers the same purposes as assafœtida in substance.

White cough mixture.

Mix one drachm of powdered spermaceti with the yolks of two eggs; then add one drachm of tincture of opium, and 5 ounces of water.

To be taken in the quantity of one wine-glassful when the cough is troublesome.

For allaying cough in the night, and procuring rest.

Mix together a dessert-spoonful of syrup of poppies and 15 drops of antimonial wine. To be taken at a draught, with or without a little warm water, either at bed-time, or in the middle of the night. Half this quantity may be given to a child under the same circumstances.

Another.—Mix together in a wine-glass, 30 drops of laudanum, 4 tea-spoonsful of vinegar, and 6 tea-spoonsful of water sweetened with a little lump sugar.

For further remedies, see COUGHS AND COLDS, &c.

Almond milk.

Take of sweet almonds, blanched, 1 1-2 oz. double refined sugar, 3-4 oz. distilled water, 2 1-2 pints. Beat the almonds with the sugar; then rubbing them together, add by degrees the water, and strain the liquor. Almost any quantity may be taken as a frequent drink to soften coughs, and to assuage urinary disorders.

Mucilage of gum arabic.

Take of gum-arabic, in powder, 4 oz. boiling distilled water, 8 oz. Triturate the gum with a small portion of the water until it be dissolved.

It is necessary to pass the mucilage through linen, in order to free it from pieces of wood and other impurities, which always adhere to the gum: the linen may be placed in a funnel.

Mucilage of gum-arabic is very useful in making up medicines, &c. it also possesses the powers of a mucilaginous demulcent in a high degree; and is frequently given in diarrhœa, dysentery, chincough, hoarseness, strangury, &c.

Gum-arabic emulsion.

Take of gum-arabic, in powder, 2 dr. sweet almonds, blanched, double refined sugar, each 1-2 dr. decoction of barley, 1 pint. Dissolve the gum in the warm decoction; and when it is almost cold, pour it upon the almonds, previously well beaten with the sugar, and at the same time triturate them together, so as to form an emulsion, and then filter.

The almonds are blanched by infusing them in boiling water, and peeling them. The success of the preparation depends upon beating the almonds to a smooth pulp, and triturating them with each portion of the watery fluid, so as to form an uniform mixture before another portion be added.

Great care should be taken that the almonds have not become rancid by keeping, which not only renders the emulsion extremely unpleasant (a circumstance of great consequence in a medicine that requires to be taken in large quantities,) but likewise gives it injurious qualities.

This emulsion is principally used for diluting and correcting acrimonious humours; particularly in heat of wine and stranguries, arising either from a natural acrimony, or from the operation of cantharides and other irritating medicines. In these cases they are to be drank frequently, to the quantity of half a pint, or more, at a time.

Decoction of marshmallows.

Take of marshmallow roots, bruised, 4 oz. sun raisins, stoned, 2 oz. water, 7 pints. Boil down to five pints, strain the decoction, and after the grounds have subsided, pour off the clear liquor.

Marshmallow root contain nothing soluble in water, except mucilage, which is very abundant in them. This decoction is therefore to be considered merely as an emollient, rendered more pleasant by the acidulous sweetness of the raisins.

Decoctions of this plant have been found exceedingly useful where the natural mucus has been abraded from the coats of the intestines; in catarrhs from a thin rheum, in diseases of the kidneys, calculous disorders, and in many other cases. It is to be observed, that this decoction must not be made too thick and viscid, by too long boiling or infusion; for then it becomes nauseous and disagreeable, and patients cannot be prevailed on to take it in sufficient quantity.

Barley water.

Take of pearl-water, 2 oz. water, 4 pints. First wash off the mealy matter which adheres to the barley with some cold water; then extract the colouring matter, by boiling it a little with about half a pint of water. Throw this decoction away; and put the barley thus purified into four pints of boiling water; then boil down to one-half, and strain the decoction.

Compound barley water.

Take of the decoction of barley, 2 pints, raisins, stoned, 2 oz. figs, sliced, 2 do. liquorice root, sliced and bruised, half do. distilled water, 1 pint.

During the boiling, add the raisins first, and then the figs, and, lastly, the liquorice, a short time before it is finished, when the strained decoction ought to measure two pints.

These liquors are to be used freely, as diluting drinks in fevers and other acute disorders; hence it is of consequence that they should be prepared so as to be as agreeable as possible. The French make great application of these diluting and softening drinks, and there can be no doubt, in slight diseases, they are found extremely serviceable; they are also useful to allay thirst, keep up perspiration, and gently nourish, even in the most acute disorders. When taken freely, they are apt to cloy the stomach, but the addition of lemon juice will prevent this.

Another.—Boil a quarter of a pound of pearl-barley in two quarts of water, skim it very clean, and when it has boiled half away, strain it. Make it moderately sweet, and put in two spoonsful of white wine. It must be made a little warm before it is drank.

Water gruel.

Put a large spoonful of oatmeal into a pint of water, stir it well together, and let it boil three or four times, stirring it often. Then strain it through a sieve, put in some salt according to taste, and if necessary add a piece of fresh better. Stir with a spoon until the butter is melted, when it will be fine and smooth.

Panada.

Put a blade of mace, a large piece of the crumb of bread, and a quart of water, in a clean saucepan. Let it boil two minutes, then take out the bread, and bruise it very fine in a basin. Mix with it as much of the warm water as it will require, pour away the rest and sweeten it to the taste of the patient. If necessary, put in a piece of batter of the size of a walnut, but add no wine. Grate in a little nutmeg, if requisite.

Isinglass jelly, &c.

Put an ounce of isinglass, and half an ounce of cloves, into a quart of water. Boil it down to a pint, strain it upon a pound of loaf sugar, and when cold, add a little wine, when it will be fit for use.—A very nourishing beverage may be made by merely boiling the isinglass with milk, and sweetening with lump-sugar.

Salop.

Put a dessert spoonful of the powder of salop, into a pint of boiling water. Keep stirring it till it becomes of the consistence of jelly, and then add white wine and sugar according to taste.

Substitute for asses' milk.

Put an ounce of hartshorn shavings into a quart of boiling barley-water; boil down to a pint, add 2 oz. of candied eringo root, and a pint of new milk; boil for a quarter of an hour longer, then strain for use.

Another.—Boil in 3 pints of water, till half wasted, 1 oz. each, of erringo root, pearl-barley, sago, and rice; strain, and put a tablespoonful of the mixture into a coffee-cup of boiling milk, so as to render it of the consistence of cream. Sweeten with loaf or Lisbon sugar according to taste.

Italian method.

Take two large spoonsful of hartshorn shavings, two ounces of pearl-barley, one ounce of eringo root, the same quantity of China root, the same of preserved ginger, and eighteen white snails bruised with the shells. Boil the whole in three quarts of water till reduced to three pints. Then boil a pint of new milk, mix it with the rest, and put it into two oz. of balsam of tolu. Take half a pint, morning and night.

Brown caudle.

Boil four spoonsful of oatmeal, a blade or two of mace, and a piece of lemon-peel, in two quarts of water, for about a quarter of an hour; taking care that it does not boil over. Then strain, and add a quart of good ale that is not bitter. Sweeten it to the palate, and add half a pint of white wine. When no white wine is used the caudle should consist of one half of ale.

White caudle.

Make the gruel as above, and strain through a sieve, but put no ale to it. When to be used, sweeten according to taste, grate in some nutmeg, and add a little white wine. Juice of lemon is sometimes added.

Beef tea.

Take off the fat and skin from a pound of lean beef, and cut it into pieces. Then put it into a gallon of water, with the under crust of a penny loaf, and a small portion of salt. Let the whole boil till reduced to 2 quarts, and strain, when it will be fit for use.

Another method.

In some cases, when the patient is very weak, the tea must be made thus:—Take a piece of lean beef, cut it across and across, and then pour on it scalding water. Cover it up close, and let it stand till cold. Then pour it off, and warm it as the patient requires, having seasoned it moderately.

Mutton broth.

Take the fat off a pound of loin of mutton, and put the lean into a quart of water. Skim it well as it boils, and put in a piece of the upper crust of bread, with a large blade of mace. Having covered it up close, let it boil closely for half an hour, snd then pour the broth clear off, without stirring. Season it with a little salt. Some persons boil turnips with the meat; but this should not be done.

Transparent soup for convalescents.

Cut the meat from a leg of veal into small pieces, and break the bone into several bits. Put the meat into a very large jug, and the bones at top, with a bunch of common sweet herbs, a quarter of an ounce of mace, and half a pound of Jordan almonds, finely blanched and beaten. Pour on it four quarts of boiling water, and let it stand all night, covered close by the fire-side. The next day put it into a well-tinned saucepan, and let it boil slowly, till it is reduced to two quarts. Be careful, at the time it is boiling, to skim it, and take off the fat as it rises. Strain into a punch-bowl, and when settled for two hours, pour it into a clean saucepan, clear from the sediments, if any. Add 3 oz. of rice, or 2 oz. of vermicelli, previously boiled in a little water. When once more boiled, it will be fit for use.

Medicinal tea.

This country affords herbs much more wholesome than either tea or coffee, and if they were all imported from a distant region, and sold at a high price, they would, no doubt, be held in great estimation. The following composition is very superior to coffee or tea, inasmuch as the infusion is very agreeable, will strengthen the stomach and invigorate, instead of debilitate, the nervous system.

Take of rosemary leaves, dried, 2 oz. sage leaves, do. 4 oz. rose leaves, do. 4 oz. peach leaves, do. 3 oz. hyssop leaves, do. 4 oz. balm leaves, do. 4 oz. male speedwell (veronica), 4 ounces.

A wine-glassful of these mixed herbs, is sufficient to make 3 pints of infusion, which is made in the same manner as tea, sugar and milk being added. In London, where herbs are sold at a dearer rate than in the country, it may be obtained at the rate of 2*s.* per pound. —Either of the above ingredients may be diminished or augmented at pleasure. If too bitter lessen the quantity of hyssop, and dried mint leaves.

In France and Germany the male speedwell is termed European tea, and is by many preferred to the Asiatic tea. As a medicine it has also a considerable share of fame, being stomachic and diuretic. It is also considered very salubrious in many affections of the lungs, as asthma, consumption, &c. and to possess the power of healing internal ulceration.

Toast and water.

Cut a slice of fine and stale loaf bread, very thin, and let it be carefully toasted on both sides, until browned all over, but not blackened or burned. Put the toast into a deep stone or china jug, and pour over it, from the tea-kettle, as much boiling water as required to make into drink. Cover the jug with a saucer or plate, and let the drink become quite cold; it will then be fit for use. Toast and water is peculiarly grateful to the stomach, and excellent for carrying off the effects of any excess in drinking. It is a most excellent drink at meals.

Saline draught.

The following mode of preparing a saline draught will be found to produce one as agreeable, and in some cases more efficacious than the one in general use, composed of the carbonate of potass and citric acid. The citric acid is often scarce, sometimes impure and expensive: the ingredients of the other are cheap, and never vary in quality.

Triturate in a mortar 15 grains of borax, and 1-4 drachm of cream of tartar, with 10 dr. of almond milk. Then add a drachm of syrup, and the same quantity of cinnamon water. This mixture will be found useful in fever and irritation of the stomach; and in almost all cases where saline draughts are prescribed. When the stomach is so irritable as to eject this and other medicines, 10 drops of laudanum may be added to the draught.

Extemporaneous effervescing draught.

Pulverize 1 ounce of citric acid, and divide it into 24 parts; that is, 24 scruples, which are to be put into separate small papers (blue paper will be best, as the acid will be thus known from the alkaline salt, which we shall presently notice.) Pulverize also 1 ounce of the sub-carbonate of soda, and divide it into 24 like packages, in white paper. When the draught is to be prepared, put the carbonate into a tumbler, half filled with spring or filtered water; when this is completely dissolved, add the acid, which will immediately cause an effervescing discharge of carbonic acid. During this effervescence swallow the draught; it will be found very refreshing in warm weather.

This draught is not purely carbonated water, for it holds a quantity of citrate of soda in solution. This, however, is far from being unpleasant.

A similar preparation may be made by using tartaric acid instead of the citric. Here there will be a discharge of carbonic acid gas, and a solution of tartrate of soda.

Extemporaneous chalybeate draught.

Prepare a phial nearly filled with water, impregnated by carbonic acid gas from carbonate of lime and sulphuric acid. Into this pour, suddenly, some iron filings; shake the phial well. A good deal of the iron will be dissolved by the carbonic acid, and more will remain oxidated at the bottom. If this water is drank, the pleasing taste of the carbonic acid will be gone, but there will be a chalybeate one in its stead; the same as that in all waters impregnated by iron.

What is called common soda water, from the pump, will answer the above purpose equally well; but in this case, the filings must be put into the bottle before the carbonate water, otherwise, its well-known unmanageable nature will prevent it, after bottling.

Sedlitz powders.

Take of Rochelle salt, 1 drachm, carbonate of soda, 25 grains, tartaric acid, 20 do.

Dissolve the two first in a tumbler of water, then add the latter, and swallow without loss of time.

To distinguish good rhubarb from bad.

The general characters of good rhubarb are, its having a whitish or clear yellow colour, being dry, solid, and compact; moderately heavy, and brittle; when recently broken appearing marked with yellow or reddish veins, mixed with white; being easily pulverizable; forming a powder of a fine bright yellow: having the peculiar, nauseous, aromatic smell of rhubarb, and a sub-acrid, bitterish, somewhat astringent taste, and when chewed feeling gritty under the teeth, speedily colouring the saliva, and not appearing very mucilaginous. The size and form of the pieces are of little consequence; only we must break the large ones to see that they are not decayed or rotten within, and also observe that they are not musty or worm eaten. This is the more necessary, as damaged pieces are frequently so artfully dressed up, and coloured with powdered rhubarb, as to impose on the buyer.

Test to discover the adulteration of calomel.

The specific gravity of calomel is a very good test to distinguish it from chalk and other white powders, as it is much heavier than any of them: but the most unequivocal test is by rubbing some of the powder in a mortar with some pure ammonia; or by shaking it in a phial with lime water. In either of these cases, if the calomel is in a pure state, the combination will become intensely black.

Medical virtues of tamarinds.

This fruit very much resembles the nature of prunes, but is more acid, and enters as an useful ingredient into the lenitive electuary. It is found of the highest use in the sore throat, as a powerful cleanser; and, put into boiling water, until moderately cold, is a delightful drink to persons parched under the heat of fever, and in the lowest stage of putrid fever.

Water cresses.

Water-cress acts as a gentle stimulant and diuretic; for these purposes the expressed juice, which contains the peculiar taste and pungency of the herb, may be taken in doses of an ounce or two, and continued for a considerable time. It should be at the same time eaten at breakfast, also at dinner, and for supper, to experience benefit from the virtues of this herb. Haller says, "We have seen patients in deep declines cured by almost entirely living on this plant."

Horehound.

It has a bitter principle, and has been recommended for pituitous asthma, coughs, and female weakness; and Haller mentions his having cured consumption, by means of an equeous infusion. The dose is 2 or 3 ounces of the expressed juice, or the infusion of half a handful of the fresh leaves, in a sufficient quantity of boiling water, drank as tea.

Wall pellitory.

This herb is powerfully diuretic; Haller says, "We have the history of a dog who, being often attacked with a suppression of urine, relieved himself by finding out and eating the parietaria; and when he could find no more of this plant he died, when there was found a calculus, whose inequalities of surface gave traces of the action of this remedy." The milk from goats fed much upon this herb, given after the operation of tapping for dropsy, has done wonders. The charcoal of this plant is recommended for preserving and whitening the teeth. The leaves strewed in granaries are said to destroy the corn weevil.

The nettle.

Nettle-broth is very useful in cases of scurvy. The expressed juice given, a table-spoonful four times a day, stops hæmoptysis, and lint dipped in it, and forced up the nostrils, has stopped bleeding of the nose when every other remedy has failed. Cancers have yielded to the juice of nettles, as much being taken as four ounces a day. Paralytic parts being stung with this herb, have been found to regain vigour, as well as limbs lost from rheumatism. The seeds produce a fine oil, and taken inwardly, in moderate quantity, excite the system, and are very forcing, therefore should be cautiously employed. Twenty or thirty grains produce vomiting. Excessive corpulency may be reduced by taking a few of these seeds daily. Lastly, 14 or 15 of these seeds made into a powder, and taken night and morning, will cure the goitre, without injuring the stamach or health.

Common tormentil root.

The root is the only part of the plant which is used medicinally; it has a styptic taste, but imparts no peculiar sapid flavour. As a proof of its powerful astringency, it has been substituted for oak bark in the tanning of skins for leather.

Extraordinary cures have been performed by this root. A poor man, fond of botanical excursions, either by tradition or accident, knew the powers of this root; and by making a strong decoction of it, sweetened with honey, he cured agues which had resisted the bark, long-standing diarrhœas, ulcers of the legs turned out of the hospitals as incurable, the worst scorbutic ulcers, the confluent small-pox, the hooping-cough, fluxes, &c. &c. so as to excite the attention of lord Wm. Russel, who allowed him a piece of ground out of his park, to cultivate his plant, which he kept as a secret. In fluxes of blood, a drachm given four times a day, in an infusion of hops, has done wonders. The danger of suddenly checking discharges, should be guarded against, of which this old man knew nothing; and occasional purges should be used, or an issue made in the thigh.

Iceland moss.

This is commonly exhibited in decoction with water, broth, or milk, after the bitter has been extracted from it by steeping it in warm water; or in substsnce, boiled in chocolate or cocoa, or made into a jelly with boiling water. Half an ounce, or an ounce, must be used daily, and continued for some time. It is strongly recommended as an article of diet in times of scarcity, and as a very convenient anti-scorbutic vegetable in long sea voyayes.—It is used,

1. In cough with expectoration, threatening to terminate in consumption; after neglected catarrhs, when the expectoration becomes more copious and purulent.

2 In emaciation from measles; from wounds and ulcers with great discharge; after salivation, and from actual ulcers in the lungs, when there is no fever, especially after neglected cold, or from translated morbid matter. In a high degreee of the disease it does little good; but the night sweats are diminished by it.

3. In pituitous consumption it is of great service.

4. In spitting of blood.

5. In chincough.

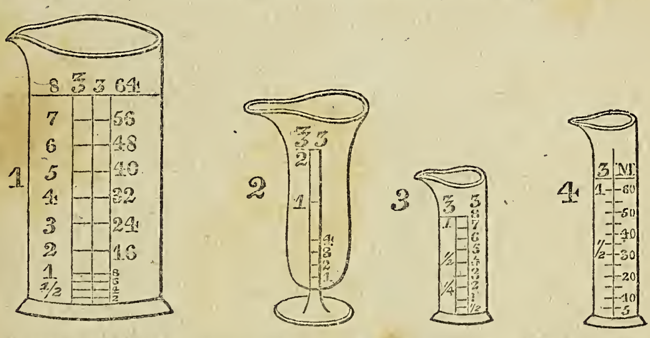
6. In diabetes, as a tonic and palliative remedy.

British substitute for Peruvian bark.

This consists of oak leaves dried in the shade, and of the bark in general of the young twigs or branches of the oak; also of the inner bark of the tree, which is to be reduced to a powder taken in the same manner as the Peruvian bark. With the leaves and young bark, a decoction is to be made, and to render it the more powerful, the powder of the inner bark is to be taken at the same time. Mr. Stuart, the discoverer, asserts that this kind of bark is a certain remedy for the scurvy. A little allspice or ginger will greatly improve it as a medicine.

Measuring glasses.

In order to measure quantities of fluids, glasses, graduated on their sides (according to the following figures,) will be found useful in all families and private laboratories:—



No. 1. Represents a glass, calculated to measure any quantity from two drachms to eight ounces.

No. 2. From one drachm to two ounces.

No. 3. From half a drachm to one ounce.—And

No. 4. Any quantity from five minims (or drops) to one drachm.

It is customary to distinguish quantities of fluids from dry substances, by prefixing the letter f. (fluid) when an ounce or drachm is mentioned in medical works (as may be seen in the first of these tables:) but in the foregoing prescriptions or formulæ, this was considered to be unnecessary, as the slightest acquaintance with the substances to be used, will point out what is implied.

Weights and measures.

By the following tables it will be seen that in the

Measure of fluids.

1 gallon measure	contains 8 pints,
1 pint	——— 16 ounces,
1 ounce	——— 8 drachms,
1 drachm	——— 60 minims.

Weight of dry substances.

1 pound	——— 12 ounces,
1 ounce	——— 8 drachms,
1 drachm	——— 60 grains,
1 scruple	——— 20 grs. or 1-3d of a drachm,

Scale of medicinal doses.

The following table of the gradations of doses of medicines for different ages, will in general be found pretty correct, and ought never to be deviated from, except by professional advice.

If at the age of manhood the dose be one drachm, the proportions will be at

From 14 to 21 years, 2 scruples; 7 to 14 years, half a drachm; 4 to 7 years, 1 scruple; 4 years, 15 grains; 3 years, half a scruple; 2 years, 8 grains; 1 year, 5 grains; 6 months three grains; 3 months, 2 grains; 1 month, 1 grain.

SALUTARY CAUTIONS.

Preservation of health on ship-board.

To counteract the scurvy, and other diseases which arise from salt provisions, and the want of fresh meat and vegetables, every ship bound on a long voyage, said Dr. Thomas, should be supplied with the following necessaries :

Provisions.

An ample store of flour, eggs for puddings, pearl barley, groats, peas, oatmeal, rice, sago, vermicelli, portable soup, potatoes, and other vegetables in season, sour kront (which is cabbage fermented with vinegar,) raisins, currants, prunes, and other dried and fresh fruits, spices, medicinal herbs, as balm, mint, pennyroyal, sage, &c.; together with tea, coffee, cocoa, sugar, treacle, honey, oranges, marmalade, essence of spruce, and fresh wort. High encomiums have been passed on the efficacy of this last by all the navigators who have made trial of it.

Spirits, beer, acids. &c.

The ship should likewise be supplied with a sufficient store of spirituous and fermented liquors, as rum, brandy, beer, and porter, together with wine, cider, vinegar, and other acids, but more particularly with the concrete juice of lemons, limes, and oranges, together with these fruits in their natural state.

Fresh animal food, &c.

If possible, a milch cow should be embarked, and there ought to be an abundance of live stock. If it can be avoided, salted provisions should by no means be constantly served out to the crew ; but fresh animal food, with a due proportion of such farinaceous substances as the ship is supplied with, or of such fresh vegetables and fruits as have been procured at whatever ports it may have touched, ought to be delivered out to the men.

Biscuit, flour, &c.

The vegetable food with which seamen are principally supplied, consist of flour, biscuit, peas, potatoes, and it very frequently happens that a great deal of the former, which is served out to the crews on board of his Majesty's ships, is in a decayed state, and by no means equal to the support of their strength. The biscuit, likewise, which is furnished them, is often too old, is worm-eaten, and has lost much of its nutritive qualities.

Water.

The health of seamen may be supposed to depend considerably on the goodness and purity of the water which they drink, as well as on the nutritive quality of their food : but it too frequently happens, by inattention in laying in the store of this necessary article, that it very soon becomes putrid and offensive, and in this state are obliged to make use of it.

Purification of the same by charcoal.

Nothing has been found so effectual for preserving water sweet at sea, during long voyages, as charring the insides of the casks well before they are filled. Care ought at the same time to be taken that the casks should never be filled with sea-water, as sometimes happens, in order to save the trouble of shifting the ballast because this tends to hasten the corruption of the fresh water afterwards put into them. When the water becomes impure and offensive at sea, from ignorance of the preservative effect produced on it by charring the casks previous to their being filled, it may be rendered perfectly sweet by putting a little fresh charcoal in powder into each cask before it is tapped, or by filtering it through fresh burnt and coarsely powdered charcoal.

No practice has answered better than that of charring their water casks on their inside. Three casks of water in one of his Majesty's dock-yards, of three years' standing, were perfectly sweet when tapped. There is, therefore, little doubt but that water may be preserved fresh and fit for drinking for any length of time, in charred barrels.

Cleanliness.

To preserve seamen in health, and prevent the prevalence of scurvy, and other diseases, it will be further necessary to keep the ship perfectly clean, and to have the different parts of it daily purified by a free admission of air, when the weather will admit of it, and likewise by frequent fumigations. This precaution will more particularly be necessary for the purification of such places as are remarkably close and confined.

Prevention of dampness and cold.

The coldness and dampness of the atmosphere are to be corrected by sufficient fires.

Cleanliness on board of a ship is highly necessary for the preservation of the health of seamen ; but the custom of frequent swabbings or washings between the decks, as is too frequently practised, is certainly injurious, and greatly favours the production of scurvy and other diseases by a constant dampness being kept up.

The removal of all offensive substances by scraping and sweeping, has indeed been more accurately attended to, during the late war, than was formerly the case in the navy ; and the washing of decks, particularly in cold and damp weather, has been much less practised. Dryness, so essential to health and comfort, is now more studied, and rubbing with hot sand, scraping, with portable fires, have been found much more salutary operations than frequent washing. Gravel, sand, and other earthy substances which have hitherto proved prolific sources of foul air, by absorbing the putrescent matters on board of the ships, have lately been dispensed with throughout the navy ; and iron tanks are now pretty generally substituted for the lower tier of water casks, and placed over the iron ballast.

Exercise and amusements.

The men should be made to air their hammocks and bedding every fine day; they should wash their bodies and apparel often, for which purpose an adequate supply of soap ought to be allowed ; and they should change their linen and other clothes frequently. In rainy weather, on being relieved from their duty on the deck by the succeeding watch, they should take off their wet clothes, instead of keeping them on, and lying down in them, as they are too apt to do. Two sets of hammocks ought to be provided for them. In fine pleasant weather, and after their usual duty is over, they should be indulged in any innocent amusement that will keep their minds, as well as bodies, in a state of pleasant activity, and perhaps none is more proper than, dancing. This makes a fiddle or a pipe and tabor, desirable acquisitions on board of every ship bound on a long voyage.

Diseases.

No seaman labouring under any disease, especially one of a contagious nature, should be suffered to remain among those that are in health. On the contrary, he ought quickly to be removed to the hospital or sick room, a place which every ship, that has a number of men on board, should by all means be furnished with; and this should be situated in an airy and dry part of it.

Effects of climate, &c.

In warm climates the crews of ships are healthier at sea when the air is dry and serene, and the heat moderated by gentle breezes, than when rainy or damp weather prevails; and they usually enjoy better health when the ship is moored at a considerable distance from the shore, and to windward of any marshy ground or stagnant waters, than when it is anchored to leeward of these, and lies close in with the land. Masters of vessels, stationed at, or trading to any parts between the tropics, will therefore act prudently, when they have arrived at their destined port, to anchor a considerable distance from the shore, and as far to windward of all swamps, pools, and lakes, as can conveniently be done, as the noxious vapours which will be wafted to the crew, when the ship is in a station of this nature, will not fail to give rise to diseases among them.

Cautions to be observed when on shore.

When unavoidably obliged to submit to such an inconvenience, some means ought to be adopted to prevent disagreeable consequences from ensuing. For this purpose a large sail should be hoisted at the foremast, or most windward part of the ship, so as to prevent the noxious vapours from coming abaft; the cabin, steerage, and between the decks, should be fumigated now and then, and the seamen allowed to smoke tobacco freely.

Unless absolutely necessary, it will be improper to permit any of the crew to sleep from on board, when stationed off an unhealthy shore; but when necessity obliges them to do so, for the purposes of wooding or watering, a tent or marquee should be erected, if a proper house cannot be procured, and this should be pitched on the driest and highest spot that can be found, being so situated, as that the door shall open towards the sea. Under cover of this, a sufficient number of hammocks are to be suspended for the accommodation of the men by night, as they should by no means be suffered to sleep on the ground.

If the tent happens unfortunately to be in the neighbourhood of a morass, or has unavoidably been pitched on flat moist ground, it will be advisable to keep up a constant fire in it by day as well as by night; and as a further preventive against those malignant disorders which are apt to rise in such situations, the men should be directed to smoke freely of tobacco, and to take a wine glassful of the compound tincture of Peruvian bark every morning, on an empty stomach, and the same quantity again at night.

Cautions when in tropical climates.

In tropical climates, the healthiness of seamen will much depend upon avoiding undue exposure to the sun, rain, night air, long fasting, intemperance, unwholesome shore duties, especially during the sickly season, and upon the attention paid to the various regulations and preventive measures. The bad effects of remaining too long in port at any one time (independent of irregularities, or harbour duties, particularly after sunset, as well as during his meridian power,) cannot be too strongly adverted to by the commander of every ship; and therefore a measure of the highest importance in the British navy is the employment of negroes and natives of the country, or at least men accustomed to the torrid zone, in wooding, watering, transporting stores, rigging, clearing, careening ships, &c.; and, in fine, in all such occupations as might subject the seamen to excessive heat or noxious exhalations, which cannot fail to be highly dangerous to the health of the unassimilated European.

The practice of heaving down vessels of war in the West Indies, in the ordinary routine of service at least, cannot be too highly deprecated, as well from the excessive fatigue and exertion it demands, as because it is a process which requires for its execution local security, or, in other words, a land that is locked, and therefore generally an unhealthy harbour. The instances of sickness and mortality from the effects of clearing a foul hold in an unhealthy harbour, are too numerous to be specified.

Intoxication.

A very productive source of disease in warm climates among seamen, is an immoderate use of spirituous and fermented liquors, as they are too apt, whilst under a state of intoxication, to throw themselves on the bare ground, where, perhaps, they lie exposed for many hours to the influence of the meridian sun, the heavy dews of the evening, or the damp chilling air of the night. The commander of a ship who pays attention to the health of his crew, will therefore take every possible precaution to prevent his men from being guilty of an excess of this nature; and likewise that they do not lie out in the open air, when overcome by fatigue and hard labour.

The different voyages of that celebrated navigator, Captain Cook, as well as that of the unfortunate La Perouse, incontestibly prove that by due care and a proper regimen, seamen may be preserved from the scurvy and other diseases which have formerly been inseparable from long sea voyages; and that they can thus support the fatigues of the longest navigations in all climates, and under a burning sun.

Noxious vapours.

Smoking or fumigating ships with charcoal or sulphur, is the most effectual means of killing all kinds of vermin, and is therefore always resorted to; but it is recommended, that no sailor nor boy be allowed to go under the decks until the hatches, and all the other openings, have been for three hours uncovered; in that time all noxious vapours will be effectually dissipated.

Captain Cook's rules for preserving the health of seamen.

1. The crew to be at three watches. The men will by this means have time to shift and dry themselves, and get pretty well refreshed by sleep before called again to duty. When there is no pressing occasion, seamen ought to be refreshed with as much uninterrupted sleep, as a common day labourer.

2. To have dry clothes to shift themselves after getting wet.—One of the officers to see that every man, on going wet from his watch, be immediately shifted with dry clothes, and the same on going to bed.

3. To keep their persons, hammocks, bedding, and clothes, clean and dry.—This commander made his men pass in review before him, one day in every week, and saw that they had changed their linen, and were as neat and clean as circumstances would admit. He had also every day the hammocks carried on the booms, or some other airy part of the ship, unlashed, and the bedding thoroughly shaken and aired. When the weather prevented the hammocks being carried on deck, they were constantly taken down, to make room for the fires, the sweeping, and other operations. When possible, fresh water was always allowed to the men to wash their clothes, as soap will not mix with sea-water, and linen washed in brine never thoroughly dries.

4. To keep the ship clean between decks.

5. To have frequent fires between decks, and at the bottom of the well.—Captain Cook's method was to have iron pots with dry wood, which he burned between decks, in the well, and other parts of the ship; during which time, some of the crew were employed in rubbing, with canvas or oakum, every part that had the least damp. Where the heat from the stoves did not readily absorb the moisture, loggerheads, heated red hot, and laid on sheets of iron, speedily effected the purpose.

6. Proper attention to be paid to the ship's copperas, to keep them clean and free from verdigris.

7. The fat that is boiled out of the salt beef or pork, never to be given to the people.

8. The men to be allowed plenty of fresh water, at the ship's return to port; the water remaining on board to be started, and fresh water from the shore to be taken in its room.

By means of the above regulations, (in addition to rules relative to temperance; and supplying the crews as much as possible with fresh meat and vegetables,) this celebrated navigator performed a voyage of upwards of three years, in every climate of the globe, with the loss of only one man.

To obtain fresh water from the sea.

The method of obtaining fresh water from the sea by distillation, was introduced into the English navy in the year 1770, by Dr. Irving, for which he obtained a parliamentary reward of 5000*l.*

In order to give a clear notion of Dr. Irving's method, let us suppose a tea-kettle to be made without a spout, and with a hole in the lid, in the place of the knob; the kettle being filled with sea-water, the fresh vapour, which arises from the water as it boils, will issue through the hole in the lid; into that hole fit the mouth of a tobacco pipe, letting the stem have a little inclination downwards, then will the vapour of fresh water take its course through the stem of the tube, and may be collected by fitting a proper vessel to its end.

This would be an apt representation of Dr. Irving's contrivance, in which he has luted or adapted a tin, iron, or tinned copper tube, of suitable dimensions, to the lid of the common kettle used for boiling the provisions on board a ship; the fresh vapour which arises from boiling sea-water in the kettle, passes, as by common distillation, through this tube into a hogshead, which serves as a receiver, and in order that the vapour may be readily condensed, the tube is kept cool by being constantly wetted with a mop dipped in cold sea water. The waste water running from the mop, may be carried off by means of two boards nailed together, like a spout. Dr. Irving particularly remarks, that only three-fourths of the sea water should be distilled; the brine is then to be let off and the copper replenished, as the water distilled from the remaining concentrated brine is found to have a disagreeable taste; and as the farther continuation of the distillation is apt to be injurious to the vessels. When the water begins to boil, likewise, the vapour should be allowed to pass freely for a minute; this will effectually cleanse the tube and upper part of the boiler.

To render sea water capable of washing linen.

It is well known that sea water cannot be employed for washing clothes.—It refuses to dissolve soap, and possesses all the properties of hard water.

This is a great inconvenience to seamen, whose allowance of fresh water is necessarily limited, and it prevents them from enjoying many of those comforts of cleanliness which contribute not a little to health. The method of removing this defect is exceedingly simple, and by no means expensive. It has lately been pointed out by Dr. Mitchell, of New York:—Drop into sea water a solution of soda, or potash. It will become milky, in consequence of the decomposition of the earthy salts, and the precipitation of the earths. This addition renders it soft, and capable of washing. Its milkiness will have no injurious effect.

PRESERVATION FROM DROWNING AND SHIPWRECK.

When a man falls overboard.

The instant an alarm is given that a man is overboard, the ship's helm should be put down, and she should be hove in stays; a hen coop or other object that can float should also be thrown overboard as near the man as possible, with a rope tied to it, and carefully kept sight of, as it will prove a beacon, towards which the boat may pull as soon as lowered down. A primary object is, having a boat ready to lower down at a moment's notice, which should be hoisted up at the stern if most convenient; the lashings, tackle, &c. to be always kept clear, and a rudder, tiller, and spare spar, to be kept in her. When dark, she should not be without a lanthorn and a compass.

There should also be kept in her a rope with a running bowline, ready to fix in or to throw to the person in danger. Coils of small rope, with running bowlines, should also be kept in the chains, quarters, and abaft, ready to throw over, as it most generally occurs, that men pass close to the ship's side, and have often been miraculously saved by clinging to ropes.

Upsetting of a boat.

If a person should fall out of a boat, or the boat upset by going foul of a cable, &c. or should he fall off the quays, or indeed fall into any water, from which he cannot extricate himself, but must wait some little time for assistance—had he presence of mind enough to whip off his hat, and hold it by the brim, placing his fingers within side the crown, (top upwards) he would be able, by this method, to keep his mouth above water till assistance should reach him. It often happens that danger is apprehended long before we are involved in the peril, although there may be time enough to prepare this, or adopt any other method. Travellers, in fording rivers at unknown fords, or where shallows are deceitful, might make use of this method with advantage.

Cork waistcoats.

Provide a cork waistcoat, composed of four pieces, two for the breast and two for the back, each pretty near in length and breadth to the quarters of a waistcoat without flaps; the whole is to be covered with coarse canvas, with two holes to put the arms through. There must be a space left between the two back pieces, and the same betwixt each back and breast piece, that they may fit the easier to the body. By this means the waistcoat is open only before, and may be fastened on the wearer by strings; or if it should be thought more secure, with buckles and leather straps. This waistcoat may be made up for five or six shillings.

If those who use the sea occasionally, and especially those who are obliged to be almost constantly there, were to use these waistcoats, it would be next to impossible that they should be drowned.

Further means.

It will likewise be proper to prepare an OIL-SKIN bag, on going to sea, for a temporary supply of provisions, in case of shipwreck. If suddenly plunged into the water, and unable to swim, it will be necessary to keep the hands and arms *under the water*,—few animals being capable of drowning, owing to their inability to lift their fore legs over their heads.

The legs, therefore, being necessarily immersed in the water, the difference between the specific gravity of the animal and the water, is sufficient to enable it to keep its nostrils and mouth above the water, and therefore it is not suffocated by the fluid, but breathes freely. But man, on the contrary, being able to lift his hands over his head, and generally doing so in case of this accident, his hands and arms make up the difference in specific gravity, and his head, impelled by the weight of his hands and arms below the water, his body fills, and he is consequently choked and suffocated. The remedy therefore is, in all such cases, to keep down the hands and arms, and as a further security, to act with them under and against the water. It will then be impossible to sink, unless the weight of clothes or other circumstances operate to the contrary.

Example.

The following singular instance of a man's life being saved by the above simple instructions is related in the Philosophical Journal. The ship Worcester was moored off Culpee, in the Ganges, in November, 1770. One of the men, who was employed forward, about the cables, slipped into the water, which was running seven or eight knots (or miles) an hour. On the alarm being given, most of those who were upon deck, ran aft, where they saw the man's head rise above the water, at the same time that he held up both his hands, and after a few seconds splashing, sunk again. Soon afterwards he arose a second time; and at that instant, the commanding officer, who had a hand trumpet in his hand, called out to him—'Keep your hands down in the water.' He did so, and remained a considerable time afloat, while one of the boats which were riding astern, was got alongside and manned. This relief was also retarded by a blunder, from too much haste, by which she was cast off without oars on board. His fears now increased, as his distance from the ship became greater every moment; and this impression made him forget his newly-acquired art; for he renewed his elevation of hands and dashing of the water, and *again sunk;* but he soon rose again, and for a short time obeyed the incessant and unvaried instruction which was vociferated to him through the trumpet. Whenever he *deviated* from this advice *he sunk;* he had disappeared in this manner at least *five* times; and had been carried almost out of hearing before the boat took him up; which, however, at last happened without any injury to his health, as he took an oar, and assisted in rowing back to the ship.

Assistance to a person in danger of drowning.

If the spectator is unable to swim, and can make the sufferer hear, he ought to direct him to keep his hands and arms under water until assistance comes; in the mean time throw towards him a rope, a pole, or any thing that may help to bring him ashore, or on board; he will eagerly seize whatever is placed within his reach: thus he may, perhaps, be rescued from his perilous situation.

But this desirable object appears attainable by the proper use of a man's hat and pocket handkerchief, which, being all the apparatus necessary, is to be used thus: Spread the handkerchief on the ground, or deck, and place a hat, with the brim downwards, on the middle of it; then tie the handkerchief round the hat, like a bundle, keeping the knots as near the centre of the crown as possible. Now, by seizing the knots in one hand, and keeping the opening of the hat upwards, a person, without knowing how to swim, may fearlessly plunge into the water, with whatever may be necessary to save the life of a fellow creature.

The best manner in which an expert swimmer can lay hold of a person he wishes to save from sinking, is to grasp *his arm* firmly between the shoulder and the elbow: this will prevent him from clasping the swimmer in his arms, and thus forcing him under water, and, perhaps, causing him to sink with him.

Cork Mattresses.

A gentleman of Bristol has proposed a new method of preserving the lives of persons shipwrecked, principally by having the mattresses used in ships formed of cork shavings. He suggests, that if each mattress was filled with the above in a proportion equal to the support of a single man, a mass of them thrown overboard, linked together by ties at each corner, would form an extensive raft, capable of sustaining a number of men, and consequently of preserving a great number of lives.

The Marine Spencer.

The Marine Spencer is made in form of a girdle, of a proper diameter to fit the body, and six inches broad, composed of about 500 old tavern corks, strung upon a strong twine well lashed together with lay-cord, covered with canvas, and painted in oil so as to make it water-proof. Two tapes of cords, about two feet long, are fastened to the back of the girdle, with loops at the ends. Another tape or cord of the same length, having a few corks strung to the middle of it, is covered with canvas painted. A pin of hard wood, three inches long and half an inch in diameter, is fastened to the front of the girdle by a tape or cord about three inches long. To use the spencer, it should be slidden from the feet close up to the arms; the tapes or cords are to be brought one over each shoulder, and fastened by the loops to the pin: those between the legs are to be fastened to the other pin. A person thus equipped, though unacquainted with swimming, may safely trust himself to the waves; for he will float, head and shoulders above water, in any storm, and by paddling with his hands, may easily gain the shore. Such a spencer may also be made of cork shavings put into a long canvas bag.

It has also been suggested, that every part of the usual dress of the sailor should be made with a view of preserving his life, in case of accident; and for this purpose, that a quantity of cork shavings or chippings should be quilted into his jacket about the collar and neck, between the inside and outside lining: or as a belt, of a considerable breadth across the back and shoulders, then principally omitted under the arms, and resumed over the chest and stomach, yet not so much as to create inconvenience. If in these, and other parts of his dress, so much cork could commodiously be worked, as would give the sailor an opportunity of recovering himself, and making use of his own powers in cases of emergency, many valuable lives might be saved.

Bamboo habit.

The bamboo habit is an invention of the Chinese, by the use of which, a person unskilled in the art of swimming, may easily keep himself above water. The Chinese merchants, when going on a voyage, are said always to provide themselves with this simple apparatus, to save their lives in cases of danger from shipwreck. It is constructed by placing four bamboos horizontally, two before, and two behind the body of each person, so that they project about twenty-eight inches; these are crossed on each side by two others, and the whole properly secured, leaving an intermediate space for the body. When thus formed, the person in danger slips it over his head, and ties it securely to the waist, by which simple means he cannot possibly sink.

Daniel's life preserver.

The body of the machine, which is double throughout, is made of pliable water-proof leather; large enough to encircle the body of the wearer, whose head is to pass between two fixed straps, which rest upon the shoulder. The arms pass through the spaces on the outside of the straps; one on each side, admitting the machine under them to encircle the body like a large hollow belt. The strap on the lower part is attached to the back of the machine, and by passing betwixt the thighs of the wearer, and buckling, holds it sufficiently firm to the body, without too much pressure under the arms. Being thus fixed, this machine is inflated by the bearer blowing from his lungs, through a cock, a sufficient quantity of air to fill it. The air is retained by turning the stop-cock. When filled, this life preserver will displace a sufficient quantity of water to prevent four persons from sinking.

Example of its efficacy.

This machine, when well filled with air, has been found capable of preventing four persons from sinking, as appears in the case of Mr. Dickenson, of Norwich, who was fortunately supplied with one of the life preservers at a time when he was upset in a pleasure boat, in company with two ladies and another gentleman.

"On tacking," says Mr. D. "to enter Norwich river, at the extremity of a broad water, two miles over, a sudden gust overset the boat, precipitating myself, companion, and two ladies, into as agitated a water as I have ever seen at sea, except in hard blowing weather. You may judge my situation at such a juncture. The machine was jokingly filled as we came along, to which I ascribe (though very unexpected by us) our preservation. The other gentleman was inexpert at swimming, and with difficulty kept himself up till I reached him; then directing him to lay hold of the collar of my coat, over which the machine was fixed, I proceeded towards the ladies, whose clothes kept them buoyant, but in a state of fainting when I reached them. Taking one of the ladies under each arm, with Mr. Goring hanging from the collar of the coat, the violence of the wind drifted us on shore upon Burgh marshes, where the boat had already been thrown."

Arabian method.

It is worthy of notice, that a contrivance, on a similar principle to Mr. Daniel's, has been in use among the Arabs from the earliest ages. Taking the skin of a goat, they sew up very completely its different openings, except the skin of one of the legs, which they use as a pipe or tube to blow up the rest of the skin, and then twist and hold it very tight to prevent the escape of the air. By means of this inflated skin, they can keep themselves floating in the water as long as they please; and, by paddling with their hands and feet, can transport themselves to considerable distances.

Chinese method.

In China, where millions of persons live almost wholly on board vessels on the canals, the children are preserved from drowning, by an empty gourd, or calabash, well corked, tied upon the back of each. The child thus paces the decks of the vessels in security, the parents knowing that, if he should happen to fall overboard, he would be prevented from sinking, or that, if he should be under water for a moment, the shell at his back would buoy him up again.

To extricate persons from broken ice.

Let two or more persons hold a rope or ropes, at both ends, stretched over the broken ice; so that the drowning person may catch hold of it.

The life boat.

The life boat is generally thirty feet long, and in form much resembling a common Greenland boat, except the bottom, which is much flatter. She is lined with cork, inside and outside of the gunwale, about two feet in breadth, and the seats underneath are filled with cork also.

She is rowed by ten men, double banked, and steered by two men with oars, one at each end, both ends being alike. Long poles are provided for the men, to keep the boat from being driven broadside to the shore, either in going off or landing. About six inches from the lower poles, it increases in diameter, so as to form a flat surface against the sand. The weight of the cork used in the boat is about seven cwt.

She draws very little water, and when full is able to carry twenty people. The boat is able to contend against the most tremendous sea and broken water; and never in any one instance, has she failed in bringing the crew in distress into a place of safety. The men have no dread in going off with her in the highest sea, and broken water: cork jackets were provided for them; but their confidence in the boat is so great, they do not use them.

The success attending this expedient for diminishing the number of unhappy individuals almost daily lost in a watery grave, appears to have been more than equal to the most sanguine expectations formed of its utility, and the great object in view, viz. the safety of those persons who hazard their own security to preserve others, has been fully accomplished.

Safe and readily constructed life boat.

In April, 1806, a model of a life-boat was exhibited before the Royal Humane Society, which may be put together in the space of half an hour, in any case of shipwreck, and which cannot sink or overset, let the sea run ever so high. All that is necessary to be provided is, a keel or plank of any convenient length, and a few pigs of iron, such as vessels usually carry out for ballast. The officers of the ship are to take care to keep two or three empty water casks, perfectly tight, the bung-holes corked up, and a piece of tin or leather nailed over them. These casks are to be lashed with ropes to the keel, along with the pigs of iron for ballast; and any spare poles or spars may be also lashed to the sides, so as to give the raft the form of a vessel, and at each end to make a lodgment for the men. Any of the square sails of the ship will form a lug-sail, and may speedily be adapted to the new life-boat, and a strong and broad spar may be lashed on as a rudder.

Another.—Let a quantity of ballast, even more than what is commonly used for sailing, be laid in the bottom of the boat, over this lay bags filled with cork, prepared for the purpose, and numbered according to their places, and if considerably higher than the gunwales so much the better; a sail or part of one folded may be thrown over from stem to stern, to combine and unite the several parts; and lastly, the whole is to be secured together by passing ropes by so many turns as may be deemed sufficient, round and round over the gunwales and under the keel, and these, if necessary, may be hitched by a turn or two, taken lengthwise.

Every person, either on board or holding by the boat, so prepared, may be absolutely certain of being carried safe through any breach whatever.

When no such preparation of cork has been made, the following is proposed as a substitute.

Let a quantity of ballast, as coals in canvas, be secured in its place, as well as circumstances will admit; then take an empty water cask, (beer cask, or any others that are tight) and fill the boat with them, and if the bilge of the cask rises considerably higher than the gunwales, it will be so much the better; let a sail then be thrown in to jam the cask and ballast in their places, as well as to combine and unite the several parts by covering all fore and aft; and lastly, let the whole be lashed and secured together, in the manner above stated. It is believed the boat in this trim, would always continue upright on her keel, be lively and buoyant on the water, and have sufficient efficacy to support the crew of any ordinary vessel, till drifted within their own depth.

It frequently happens that after men have gained the shore, they perish of cold for want of dry clothes. As a remedy for this, every man should try to secure one or two flannel or woollen shirts, by wrapping them up tightly in a piece of oiled cloth or silk; and to guard against tearing, the last might be covered with canvas, or inclosed in a tin box.

Further method of preservation in cases of shipwreck.

It being the great object, in cases of shipwreck, to establish a communication betwixt the vessel and the shore with the least possible delay, various methods have been invented and pointed out for this purpose.

A common paper kite, launched from the vessel, and driven by the wind to the shore, has been supposed capable of conveying a piece of pack thread, to which a larger rope might be attached and drawn on board.

A small balloon, raised by rarified air, might be made to answer the same purpose.

A sky rocket of a large diameter, has also been considered as capable of an equal service, and, indeed, this method seems the best; for besides the velocity of the discharge, could it be brought to act during the night, it must both point out the situation of the ship, and the direction that the line took in flying ashore.

To preserve ships from leaking.

First caulk well the inside planks or lining, then fill the vacant space between the timbers and the out and inside planks, with boiling pitch or resin, as high as the main gun deck. The pitch being put in very hot, will run into the smallest cranny, and make the ship as tight as a bottle, and at the same time ballast her. There will be no room for vermin, as rats, &c. and the pitch will serve many other uses when taken out, and therefore will not ultimately be very expensive.

Useful hints when a leak is sprung.

When a vessel springs a leak near her bottom, the water enters with all the force given by the weight of the column of water without, which force is in proportion to the difference of level between the water without and that within. It enters therefore with more force at first, and in greater quantity, than it can afterwards, when the water within is higher. The bottom of the vessel, too, is narrower, so that the same quantity of water coming into that narrow part, rises faster than when the space for it is larger. This helps to terrify. But as the quantity entering is less and less, as the surfaces without and within become more nearly equal in height, the pumps that could not keep the water from rising at first, might afterwards be able to prevent its rising higher, and the people might have remained on board in safety, without hazarding themselves in an open boat on the wide ocean.

Besides the greater equality in the height of the two surfaces, there may sometimes be other causes that retard the farther sinking of a leaky vessel. The rising water within may arrive at quantities of light wooden works, empty chests, and particularly empty water casks, which, fixed so as not to float themselves, may help to sustain her. Many bodies which compose a ship's cargo may be specifically lighter than water: all these, when out of water, are an additional weight to that of the ship, and she is in proportion pressed deeper in the water, but as soon as these bodies are immersed, they weigh no longer on the ship: but on the contrary, if fixed, they help to support her in proportion as they are specifically lighter than the water.—(*Franklin's Works.*)

Temporary nautical pump.

Captain Leslie, of the George and Susan, in a voyage from North America to Stockholm, adopted an excellent mode of emptying water from his ship's hold, when the crew were insufficient to perform that duty. About 10 or 12 feet above the pump, he rigged out a *spar*, one end of which projected overboard, while the other was fastened, as a lever, to the machinery of the pump. To the end which projected overboard, was suspended a water-butt, half full, but corked down: so that when the coming wave raised the butt-end, the other end, depressed the piston of the pump; but at the retiring of the wave, this was reversed, for, by the weight of the butt, the piston came up again, and with it the water. Thus, without the aid of the crew, the ship's hold was cleared of the water in a few hours.

Another.—When a vessel springs a leak at sea, which cannot be discovered, instead of exhausting the crew by continual working at the pumps, they may form, with very little trouble, a machine to discharge the water, which will work itself, without any assistance from the hands on board.

Let a spar, or spare top-mast, be cut to the length of eight or ten feet, or more according to the size of the vessel; mortice four holes through the thickest end, through which run four oars, fixing them tight, exactly in the middle. To the four handles nail on four blades, (made of staves) the size of the other ends, which will form a very good water wheel if the oars be strong: then fix into the opposite end what is commonly called a crank: the iron handle of a grindstone would suit extremely well: if this is not to be had, any strong bar of iron may be bent into that form, wedging it tight to prevent its twisting round. Then nail up a new pair of chaps on the fore part of the pump, for a new handle to be fixed in, which will point with its outer end to the bow of the vessel; this handle will be short on the outside, but as long on the inside as the diameter of the bore of the pump will admit, in order that the spear may be plunged the deeper, and of course the longer stroke. The handle must be large enough to have a slit sawed up it, sufficient to admit a stave edgeways, which must be fastened with a strong iron pin on which it may work. The lower end of the stave must be bored to admit the round end of the crank; then fix the shaft, with the oars (or arms) over the gunwale, on two crotchets, one spiked to the gunwale, and the other near the pump, cutting in the shaft a circular notch, as well to make it run easier, by lessening the friction, as to keep the whole steady. A bolt is now to be fixed in each crotchet close over the shaft, to keep it from rising. As soon as the wheel touches the water it will turn round, and the crank by means of the stave fixed on its end, will work the handle of the pump.

To render the sinking of a ship impossible.

According to the present plan of ship-building, in case of leaks at sea, which cannot be kept under by pumping, the ships and crews must inevitably be lost, to the great affliction and loss of thousands of families. In order to prevent such accidents in future, which hitherto have been too common, a gentleman, of the name of Williams, suggests an easy arrangement which, if universally adopted, even under the worst circumstances, will enable the crew to save not only themselves, but the ship and cargo likewise:—

It is, that every ship should be divided into four equal compartments, with partitions of sufficient strength; the probability, in case of a leak is, that it would take place in one of them; and allowing it to fill, the safety of the ship would not be endangered, for 3-4 of the cargo would remain undamaged. To prove this, we will suppose a vessel of one hundred tons so divided, (though the plan is as applicable to a ship of one thousand tons as a canal boat) and, that one of the compartments filled with water: this would not increase her weight more than from six to eight tons, from the cargo previously occupying the space, and reducing her buoyancy about one third. The same effect would take place, was she sent out of port with only one-fourth of her hull above water, though vessels are more commonly sent out with one-third, and even more. Packets, as they carry little or no cargo, may with safety be divided into three compartments. In case of fire the advantage is equally obvious, as any of the quarters might be inundated with safety.

BATHING.

Art of swimming.

It has been observed before, that men are drowned by raising their arms above the water, the unbuoyed weight of which depresses the head: all other animals have neither motion nor ability to act in a similar manner, and, therefore, swim naturally. When a man therefore falls into deep water, he will rise to the surface, and continue there if he does not elevate his hands. If he move his hands under the water, in any manner he pleases, his head will rise so high as to allow him liberty to breathe; and if he move his legs, as in the act of walking, (or rather of walking up stairs,) his shoulders will rise above the water, so that he may use less exertion with his hands, or apply them to other purposes. These plain directions are recommended to the attention of those who have not learned to swim in their youth, and they will, if attended to, be found highly advantageous in preserving life.

If a person falls into the water, or gets out of his depth, and cannot swim—and if he wishes to drown himself, let him kick and splash as violently as possible, and he will soon sink. On the contrary, if impressed with the idea that he is lighter than the water, he avoids all violent action, and calmly but steadily strives to refrain from drawing in his breath, whilst under the water, and keeps his head raised as much as possible; and gently, but constantly, moves his hands and feet in a proper direction, there will be a great probability of his keeping afloat until some aid arrives.

Cramp in bathing.

For the cure of the cramp, when swimming, Dr. Franklin recommends a vigorous and violent shock of the part affected, by suddenly and forcibly stretching out the leg, which should be darted out of the water, into the air, if possible.

Precautions in bathing.

Never venture into cold water, when the body is much heated.—

Dr. Franklin relates an instance, within his own knowledge, of four young men, who, having worked at harvest in the heat of the day, with a view of refreshing themselves, plunged into a spring of cold water; two died upon the spot, a third the next morning, and the fourth recovered with great difficulty.

Be very careful where you bathe, even though ever so good a swimmer, lest there should be weeds to entangle the feet, or any thing else to endanger life. It is by the neglect of this precaution that many good swimmers expose themselves to greater danger than those who cannot swim at all; their very expertness thus becoming fatal to them, by tempting them into places where their destruction is inevitable.

The cold bath.

1. In using the cold bath, it is of essential importance to know that there is no truth in the vulgar opinion, that it is safer to enter the water when the body is cool, and that persons heated by exercise, and beginning to perspire, should wait till they are perfectly cooled.

It is a rule liable to no exception, that moderate exercise ought always to precede cold bathing; for neither previous rest, nor exercise, to a violent degree, are proper on this occasion.

2. The duration of cold bathing, ought to be short, and must be determined by the bodily

constitution, and sensations of the individual, for healthy persons may continue in it much longer than valetudinarians. In summer it may be enjoyed for an hour, when, in spring, or autumn, one or two minutes will be sufficient. Under similar circumstances, cold water acts on aged and lean persons with more violence, than on the young and corpulent; hence the former, even in the hottest days of summer, can seldom with safety remain in the bath longer than a quarter of an hour; while the latter are generally able to sustain its impressions for a much longer period.

3. The head should first come in contact with the water, either by immersion, by being showered upon, or by covering it for a minute with a wet cloth, and then plunging head foremost into the water.

4. As the immersion will be less felt when it is effected suddenly, and as it is of consequence that the first impression should be uniform over the body, the bath ought not to be entered slowly or timorously, but with a degree of boldness. A contrary method, in some constitutions, is dangerous, as it propels the blood from the upper to the lower parts of the body, and thus predisposes to a fit of apoplexy. For these reasons the shower bath is attended with considerable advantages, beccuse it transmits the water quickly over the whole body.

5. The morning is the proper time for using the cold bath, unless it be in a river; in which case the afternoon, or from one to two hours before sun-set, will be more eligible. On the whole, one hour after a light breakfast, or two hours before, or four after dinner, are the best periods of the day for this purpose.

6. While the bather is in the water, he should not remain inactive, but apply brisk and general friction, and move his arms and legs, to promote the circulation of the fluids from the heart to the extremities. It is extremely imprudent to continue in the water till a second chilliness attacks the body.

7. Immediately after leaving the bath, it is necessary that the bather should quickly wipe his body dry with a coarse dry cloth. He should not afterwards sit inactive, but if the season permit, he ought to take gentle exercise till the usual circulation, and the customary action of the muscles, be restored.

8. The best place for cold bathing is in the sea, or a clear river; but where neither of these can be conveniently had, the shower bath may be used.

9. The principal advantages to be expected from cold bathing, besides the salutary exercise, are either the reduction of excessive heat, or the producing of a salutary re-action of the system. In the former, it has been found useful in several fevers. Affusion, however, in those cases, is most advisable, and more efficacious in reducing the morbid temperature, than immersion. But the cold affusion must not be employed in the cold stage. As soon as the hot fit is formed, the cold affusion is to be used immediately, and repeated occasionally. In the sweating stage, it is to be cautiously avoided.

In nervous diseases too, the cold bath has sometimes been of service.

In gouty and rheumatic complaints, in diseases of the hip joint, lumbago, or sciatica, after the removal of those complaints by the use of the vapour, or hot bath, and in conjunction with other remedies, the alternation of the cold with the vapour bath, fortifies the constitution against a return of such attacks.

10. The best preparation for cold bathing, is to begin with a warm, then a tepid, and afterwards a cool-bath; after this course the bather may in general plunge with safety into the cold-bath. In most cases, a bath every second day, from the commencement of the warm bathing, to the end of a fortnight, will be sufficiently frequent; afterwards the cold immersion may be continued daily.

Sea-bathing.

The use of the tepid salt water bath, or indeed of sea-bathing itself, when the water is warm, (that is,) between 60 and 80 deg. of heat, is in many cases beneficial, when a colder temperature would be decidedly injurious.

It may be satisfactory to know, that, in situations distant from the shore, where sea-water cannot be had, artificial sea-water, made by dissolving four lbs. of bay-salt in 16 gallons of fresh water, possesses all the properties of the water of the sea, a small portion of sulphate of magnesia excepted.

The shower-bath.

The cold shower-bath is less alarming to nervous persons, and less liable to produce cramps, than cold immersion; it may be considered as the best and safest mode of cold bathing, and is recommended in many nervous complaints.

It has also afforded relief in some cases of insanity.

Substitute for a shower bath.

Where the saving of expense is an object, it may be effectually answered by filling a common watering pot with cold water. Let the patient sit undressed upon a stool, which may be placed in a large tub, and let the hair, if not cut short, be spread over the shoulders as loosely as possible. Now pour the water from the pot over the patient's head, face, neck, shoulders, and all parts of the body, progressively down to the feet, until the whole has been thoroughly wetted.

A large sponge may, in some measure, be substituted for the shower bath; particularly in affections of the head, which arise from intemperance, night watching, study, or other perplexity. Head-ache, from these causes, will be greatly alleviated by wiping the top and fore-part of the head with a sponge frequently dipped in water. The cold thus produced will check the determination of blood to the head, and has often been known to prevent delirium and insanity.

The tepid-bath.

On immersing the body in a tepid-bath, which takes its range from 85 to 95 degrees, no striking sensation either of heat or cold is felt. But a person much chilled, will, on entering the tepid-bath, feel the water warm, while another who had been heated by exercise, will find it insensibly cold.

The tepid-bath is attended with several advantages: the surface of the skin is, by it, freed from that scaly matter, which always collects more or less in the healthiest person; the pores of the skin thus being free, the natural perspiration is promoted, the limbs are rendered supple, and any stiffness which may have been produced by exertion, or fatigue, is removed. Such immersion has been found to allay thirst; a proof that a quantity of water is absorbed, and enters the body through the skin.

The tepid-bath seems the best adapted to the purposes of cleanliness and healthy exercise. To delicate females, and young children, it is of primary importance. Nothing can be more absurd than the common practice of mothers and nurses in washing children, no matter how sickly or unwell, with cold water, under the idea of bracing the constitution: whereas, the use of tepid water alone, is not only the most agreeable, but the most proper fluid to excite the energies of the system in young children.

Affusion with tepid water, has generally the same result, except, that if the body continue exposed to the air after the affusion, a sensation of cold is produced, which ought to be avoided, by wiping dry the upper part of the body, whilst the lower extremities are still covered with water.

There can be little doubt, that human existence, by tepid bathing, temperance, and proper exercise, may be made more agreeable, and also be prolonged.

The warm-bath.

On entering a bath from 95 to 96 degrees, an agreeable sensation of warmth is experienced, and this sensation is more striking in proportion as the body has been previously cooled. The patient feels languid after the warm-bath, and has a desire for repose, although the spirits are exhilirated, and previous irritability allayed.

It has been generally thought, that one constant effect of the warm-bath is to relax and debilitate the body, but this idea is now admitted to be founded in mistake. Some particular constitutions may be so affected, but this has been attributed, either to the heat of the bath having been too great for them, or the immersion having been continued for too long a time.

When the warm bath is intended to produce increased perspiration, it is best employed in the evening, when the immersion should not exceed ten minutes, and the patient should be removed from the bath to a warm bed.

When it is not intended to excite perspiration, any time, from an hour after breakfast, till dinner, will be proper: in these cases the bathing may be protracted to fifteen or twenty minutes, according to the feelings of the patient; gentle exercise in the open air should be afterwards employed. It is an error to suppose that persons who have been immersed in the warm-bath, are more liable to take cold: for the body is better able to resist the action of cold, immediately after coming out of a warm-bath than perhaps in any other given situation.

The medicated warm-bath.

When this is employed, it is generally supposed that the impregnating matters produce, on the system, effects similar to those which follow their internal exhibition. Immersion in a sulphureous warm-bath commonly produces an increased perspiration; and the similar use of a chalybeate bath, especially if it contain any aluminous impregnation, is followed by a corrugation of the skin, and an increased action of the vessels.

This kind of bath has been found decidedly beneficial in many diseases of the skin, particularly in children, in surfeit, in elephantiasis, leprosy, &c.

Barege water.

The following recipe for a medicated bath, has been successfully used in a variety of cutaneous disorders, from the slightest eruption on the face and skin, to the most obstinate scorbutic complaints approaching to leprosy. It was the medicated bath used by Napoleon, and is prepared thus:—

To produce water similar to that of the *Source Royal*, at *Barege*, take for every gallon of water which is to be impregnated, two grains of alum, two grains of carbonate of lime, two grains of hard Spanish soap, four grains of muriate of soda, twenty grains of dried carbonate of soda, and sixteen grains of the sulphuret of potash; grind the materials altogether, and boil them in as much water as will dissolve them; stir them over the fire till the sulphurated hydrogen gas begins to be disengaged, which is known by a smell similar to rotten eggs; then mix the ingredients with the water-bath previously prepared. When this combination is formed, and the proper degree of heat added, we may expect every salutary effect by this artificial water, as certainly as if used at its natural source.

The vapour-bath.

The vapour-bath, used in this country, is simple in construction and effectual in its application. It is an apparatus to which the steam of boiling water, either simple or medicated, is conveyed through pipes from a common *steam-boiler*. In this apparatus, the stimulant power of heat is modified and tempered by the moisture diffused through the air; and as the elastic vapour, like air, is a less powerful conductor of heat than a watery fluid, the effect of vapour in raising the temperature of the body is much less than that of the hot-bath. Its heating effects are also further diminished by the copious perspiration which ensues: so that on every account, the vapour bath is safer, it being, in most cases, more effectual than the hot water bath, and may be employed with success where the hot-bath would be attended with danger. It may be applied also to the whole, or to any part, of the body. To effect this, the steam is conveyed from the digester, or steam-pot, through a leaden tube into a wagon-roof frame, which may be made of hoops of whalebone, of cane, forming a cradle, under a blanket, or other covering to confine the steam.

The vapour-bath is strongly recommended in all cases of fever, where perspiration is particularly desirable. The more general and immediate effects of this bath in fever are, that it disposes to a calm and sound sleep, and regulates the discharge by the skin: the increase of the symptoms, sooner or later in the evening, is lessened, if not prevented; the head is prevented from delirium, and the symptoms are moderated, till the disease terminates. It has also been found beneficial in inflammation of the bowels, complaints of the liver, water in the head, dropsy, glandular swellings of the neck, calculous complaints, gout, leprosy, white swelling, strangulated hernia, affections of the skin, &c. See page 250, of this volume.

The temperature necessary for the vapour-both, and the time for using, and remaining in it, must depend upon the purpose for which it is designed. From ten minutes, to a quarter of an hour, is, in general, sufficient; but there may be cases where half an hour, or even an hour, may be necessary; the temperature is from 110 to 120.

The best time for using this bath is in the morning, or at any period before dinner; after the body is properly dried and rubbed, the cool air is grateful and perfectly safe; there is no danger whatever from cold: we are less liable to take cold after warm and vapour bathing than at any other time. It must not be concluded, however, that immediate exposure to external air, in all circumstances, after warm or vapour bathing, is safe: there are exceptions in several states of diseases, where the object is to ensure and increase perspiration. In such cases it is obviously our business to remove the patient to bed. But when the bath is used for cleanliness, refreshment, or, as a luxury, the rule admits of no exception.

General observations on bathing.

Whenever the cold-bath is deemed proper, the warm, tepid, and cool-bath, should be first used as a preparative; the patient should remain in, the first and second time, for ten minutes, and only immerse the body for a minute or two, when he proceeds to use the cold-bath. The bather should always go into the cold-bath when warm, and seldom exceed one plunge; which produces a glowing and healthful appearance of the countenance, and an additional flow of spirits; when these are not produced, the cold-bath should not be repeated. In some cases, attended with fulness of habit, it may be necessary to bleed, or take a dose of medicine, previously to the use of the bath. In hysteria, epilepsy, insanity, hydrophobia, and other convulsive disorders, the cold-bath has been used with advantage; but in these complaints it should be used during the paroxysm.

In all disorders affecting the head with pain, giddiness, sense of fulness, water in the head, and deafness; in all diseases of the breast; in asthma, catarrh, water on the chest, and every species of consumption; in indigestion, chronic pains in the stomach and bowels; in all internal inflammations of the liver, spleen, kidneys, intestines, &c.; in gout, rheumatism, diseases of the joints, scrofula, glandular swelling, in every kind of dropsy, and in all eruptive and cutaneous diseases, in early infancy, in *every* period of pregnancy, and in advanced life, the cold-bath is injurious.

On the other hand, the warm and vapour bath, properly regulated, will be found principal agents in the cure of most of the foregoing disorders; in eruptions of every kind; in œdematus swellings of the limbs, in stiffness and contractions of the joints; in all those disorders called nervous; in every case requiring a course of mercury; in early infancy, in the latter period of pregnancy, and in the decline of life, to the last stage of existence; the warm and vapour-bath may be used with advantage and safety. In a plethoric state of the body, or where there is much determination to the head, previously to the use of the warm or vapour-bath, steps must be taken to remove the plethora, or to relieve the head.

Preservation of the health of soldiers.

In the army, it is observed by the learned Sir John Pringle, that the preservation from diseases ought *not to depend on medicines, nor on any thing which a soldier can have in his power to neglect.* Innumerable instances confirm the justness of this remark; and it is an unquestionable fact, that the preservation of the health of the troops depends as much on the observance of due regulations respecting diet, &c. in camp or in quarters, as the success of their military exertion does on their discipline and subordination in the field.

Diet.

In all classes of men, the use of proper diet is indispensable for the preservation of health. The food of the soldier may be coarse, but it should be wholesome and abundant.

The men ought to be divided into small messes, and proper stoppages made from their pay to provide food. It should be the business of an officer to see that the meals be regular and sufficient, properly cooked, and that the men behave at them with decorum. Great care ought to be taken to prevent the introduction of tainted meat, mouldy, or half-baked bread, spoiled corn, mixed flour, or other dietetic substances of bad quality.

One meal of animal food is sufficient for a healthy man in twenty-four hours; and it would be a good regulation, were that meal taken some hours later than is at present the custom in camp. Digestion is best performed while the body remains at rest. Military exercises should therefore be avoided as much as possible immediately after eating; and those men whose duty calls them to watch during the night, will be always better supported by a full than by an empty stomach.

Meat, vegetables, and fruits.

Nothing is so agreeable, and at the same time so wholesome to a soldier, after a fatiguing and perhaps a wet march, as some warm soup. To boil the meat is therefore the mode of cooking which ought to be most generally used in the army. Every effort should be made to procure vegetables to boil with the meat; but it is not necessary to be very delicate in what are selected for this purpose. If the various kinds of cabbage, carrots, parsnips, onions, and potatoes, which are universally approved of, cannot be procured, wild or water cress, brooklime, scurvy-grass, wild sorrel, and lettuce, which are to be found in every field, make wholesome as well as agreeable additions to soup. When in a fixed camp, soldiers should be encouraged to cultivate various kinds of culinary vegetables, and especially potatoes. It would conduce much also to the salubrity as well as the nutritious qualities of these soups, were every mess to have a certain quantity of barley, or, what affords more substantial nourishment, groats, dried peas, or rice, to add to their broth. Fresh animal food should always be provided, if possible. When circumstances, however, render it necessary to subsist on salted provisions, their injurious effects may be considerably mitigated, by paying proper attention to their goodness, as well as to the mode of dressing them.

Ripe fruits, in moderate quantity, are wholesome; and, contrary to the vulgar prejudice, tend rather to prevent than to induce complaints of the bowels. Unripe fruits of all kinds, especially stone-fruits, are well known to be injurious, and should never be eaten raw.

Prevention of scurvy.

To prevent an army from being seized with the scurvy, during a season when fresh-meat and vegetables are likely to become scarce, it would be prudent to have a large quantity of potatoes, onions, garlic, mustard-seed, leeks, sour-krout, pickled cabbages, &c. and sub-acid fruits laid in store before hand. These might be sold in moderate quantities, at a low rate, during winter; and all means should at the same time be used to oblige the men to form themselves into messes, and buy a little fresh meat daily. Fermented malt-liquor cider, and acescent drinks, are at no time more useful than when the scurvy is beginning to make its appearance. On such occasions the Russian quass-loaves would be particulary wholesome and convenient for making small beer. These are composed of oat or rye-meal mixed with ground malt; and, when made into cakes with plain water, are baked and kept for use. They make a pleasant acidulous beverage by being infused twenty-four or thirty hours in boiling water, with a little dried mint or other aromatic herb.

Prevention of flux.

During the prevalence of bloody fluxes, the men ought to be allowed plenty of farinaceous vegetables, such as groats, barley, rice, potatoes, and dried peas; but they should refrain entirely from pot-herbs and green fruits. No objection is made, however, to the free use of ripe fruits. On these occasions they should also use fat and mucilaginous broths; or sago, and a little port wine, if it can be procured good; but meagre wines and fermented liquors would be pernicious to the bowels.

Quality of a soldier's breakfast.

It has been observed, that the custom of taking a light and warm breakfast, such as tea or coffee, renders a man delicate and susceptible of taking cold. So much were the leaders of the French impressed with the truth of this remark, that warm breakfasts were strictly prohibited in one of their northern armies. Every man was allowed half a pint of good wine, which he took with his bread. Few of these men were unfit for duty, though the weather was extremely severe. It may be laid down as a maxim, that a soldier will be able to bear fatigue and hardship with vigour and alacrity, in proportion as he lives well. In this countiy, a pint of good porter, or sound ale, might be substituted for wine. The men should not be allowed to purchase this at pleasure; but it should be regularly issued, and the expense stopped from their pay.

Cheap, excellent, and nourishing puddings may be composed of boiled barley, molasses, and ginger.

Bread.

Bread, emphatically termed the staff of life, is what the soldier chiefly depends upon for support. While an army is in motion, it is difficult to furnish this article in abundance, and with regularity. It is the settled, but perhaps erroneous, custom to furnish armies with bread fermented and baked into the form of loaves. Biscuits would, on many occasions, be preferable: a loaf sometimes becomes mouldy and uneatable in a few days: biscuits will keep in perfection for months. Bread baked amidst the hurry and confusion of an army in motion, is apt to be improperly prepared; and in this state it is very unwholesome; but the quality of biscuit made at a distance, and with regularity, may always be depended upon. The hardness of biscuit is removed by soaking it in warm water; and the rawness or doughiness of bread, in some measure, by toasting it.

Spirituous liquors.

It would be well were the promiscuous sale of distilled spirits to soldiers wholly prohibited. In hot weather they are peculiarly injurious. The mortality of our troops in the West Indies has been attributed by every medical writer, as much to the intemperate use of spirits as to the effects of the climate. It is not denied that in some situations they may be necessary; but that necessity is to be judged of by the physician or the commanding officer. In cold damp weather, when a little spirit might be allowable and useful, soldiers would find a tolerable substitute in a draught of hot water with a tea-spoonful of fresh grated ginger in it. This, in common cases, would be of equal utility with spirituous liquors, and does not possess the power of intoxicating.

Clothing.

Another article of importance with regard to soldiers is clothing; which is, in general, far from being well adapted to the military life. The stiff bandage that surrounds the neck, and the tight ligatures which constrain the articulations of the loins and knees, should, if possible, be avoided. Freedom of respiration is no doubt impeded by the pressure of the belts crossing upon the chest. In an active campaign, much often depends on rapidity of movement, and promptitude of exertion; but if a certain portion of the strength of each individual be exhausted in counteracting the pressure on his muscles, or in sustaining perhaps an unnecessary burthen, the sum of the whole, which might otherwise be employed in supporting unavoidable fatigue, must be considerably diminished.

Many remarks might be made on the other parts of the military dress; but, suffice it to observe, that prudence, humanity, and sound policy conspire to recommend the use of woollen clothing for soldiers, at least during an encampment. A woollen stock or neckcloth, with a flannel waistcoat and worsted gloves, may be purchased for about half a crown per man, and would contribute to preserve the lives of many, whereas the expense of medicines and recruiting will greatly exceed the price of these articles.

Cleanliness.

Personal cleanliness is likewise an object of great importance in an army; for it is observed that those men who are most negligent in this respect, are the first who are infected by diseases. Hence, the contagion is frequently spread through a whole army, among whom it often proves more fatal than the sword. The strictest attention, therefore, is necessary to enforce the observance of this practice.

Caution to travellers.

When going to ride on horseback, it will be right, before mounting, to examine carefully the trappings of the horse, to ascertain whether the bridle, girths, and stirrups, be safe and well fixed, and the animal properly shod. Also, when going to drive in a gig or chaise, it will be proper not only to inquire, but to ascertain, whether the harness, wheels, and other things be well adjusted.

Slack reins.

Never ride or drive with too slack a rein. From a neglect of this rule, horses which are apt to stumble, sometimes fall down, to the great danger, if not the injury, of the persons who are riding or driving them. Besides, in the case, of fright, or running away, the command of the reins is gone.

Jumping out of gigs, &c.

Should it be necessary, in consequence of the horse's running away, or any other cause, when riding in a gig, to quit it hastily,—if it be possible, leap out behind, taking care not to lean too forward, which is by far the safest method; for the motion of the carriage being opposite to the direction of the leap, the person will come to the ground with the least possible force.

Great coats and umbrellas.

With respect to providing great coats, umbrellas, &c. when going a long journey, there has long been in use a very quaint maxim, "If it does not rain, take such things with you; and if it does, do as you please:"—implying that if the weather be, now ever so fine, it is not long to be trusted.

Stage coaches.

In travelling in a stage coach, passengers should be very careful to keep down the windows; or at least one, and the other on the cheek, in order to promote a free circulation of air. When this cannot be accomplished, on account of the inclemency of the weather, one window on the lee side should be invariably kept open to its full extent.

Cramp.

Cramp in the calves of the legs is a very disagreeable complaint, to which those who have their legs long confined in tight boots are subject in travelling. An effectual preventive of this pain, is to stretch out the heel of the leg as far as possible, at the same time drawing up the toes towards the body.

Travelling on foot.

In long journeys much caution is needful, on account of the fatigue they occasion and the heat they produce in the body, thus tending to bring on fever. This is often hastened by the improper management and intemperance of the travellers themselves. Those who walk long distances, especially before their feet are well seasoned by the practice, are very liable to have blisters formed at the bottom of them. For this, take a large needle full of worsted; pass it through the blister from side to side, but leave the ends of the worsted in it, and clip off the remainder. The opening will cause the blister to discharge, and the worsted will keep it open, at the same time that it will prevent the outer skin from sticking to the inner. By this plan, at night, after the day's walk, the traveller will find himself, the next morning, as easy, and as able to walk again, as though nothing had happened. If the feet are merely inflamed without having any blister raised upon them, it is a good plan to wash them with milk-warm water, just before going to bed.

Dogs.

Some dogs are very snappish and ill natured, and cannot allow a traveller to pass without growling, but it is a very foolish practice, to say the least of it, to provoke them to put their snarling threats into execution. The following instance occurred, not many years since, in St. James's Park. "A young gentleman passing a dog, slightly touched it with a switch he carried in his hand; upon which the ferocious animal turned and seized him by the belly; and in spite of the exertions of those around him, he continued his hold until the bowels of the youth appeared at the wound. He died within a few hours."

Wandering in the night.

Let the traveller take some star or stars to guide him in the particular course which he knows to be the best; and if he wishes to distinguish distant sounds, let him apply his ear for some time close to the ground.

Count Berchtold's cautions.

Those who travel on foot, especially in hot climates, should never sleep under the shadow of a tree, or near a hemp field.

Thirst is more effectually quenched by eating fresh fruit, and a morsel of bread, than by drinking water: lemon juice, or a little vinegar mixed with water, is better than water alone.

After a long journey on foot, it is unwholesome to take a plentiful meal, or to sit near a great fire. Travellers on foot should wear flannel waistcoats next the skin; and all travellers should carefully avoid damp beds, and the falling of the evening dew after a free perspiration.

To detect dampness in beds.

Let the bed be well warmed, and immediately after the warming-pan is taken out, introduce between the sheets, in an inverted position, a clean glass goblet: after it has remained in that situation a few minutes, examine it; if found dry and not tarnished with steam, the bed is perfectly safe: and vice versa. In the latter case, it will be best to sleep between the blankets.

To prevent danger from wet clothes.

Keep, if possible, constantly in motion, and take care not to go near a fire or into a very warm place, so as to occasion sudden heat, till some time after procuring dry clothes. Sitting or standing in a draught, or current of air, in wet clothes, is particularly injurious, and often fatal.

Erroneous custom of pouring spirits into boots or shoes.

The custom of pouring brandy into boots or shoes, when the feet have got wet, with a view to prevent the effects of cold, is a practice which (though very common) is founded on prejudice and misconception, and has in some cases proved fatal, by bringing on inflammation. This practice was adopted upon the supposition that, because spirits, when swallowed, excite an universal warmth, and restore the circulation in the extremities, they must do the same when applied to the extremities. But the reverse happens. Fluids, when evaporating, produce cold; and the lighter and more spirituous the fluid, the more quickly it evaporates, and the greater is the degree of cold generated. This may be proved by a very simple experiment. If one hand be wetted with spirits and the other with water, and both are held up to dry in the air, the hand wetted with spirit wlll feel infinitely colder than the other:—whatever danger, therefore, arises from cold or damp feet, is generally enhanced by the practice alluded to.

To escape the effects of lightning.

When persons happen to be overtaken by a thunder-storm, although they may not be terrified by the lightning, yet they naturally wish for shelter from the rain which usually attends it; and, therefore, if no house be at hand, generally take refuge under the nearest tree they can find. But in doing this, they unknowingly expose themselves to a double danger; first, because their clothes being thus kept dry, their bodies are rendered more liable to injury,—the lightning often passing harmless over a body whose surface is wet; and, secondly, because a tree, or any elevated object, instead of warding off, serves to attract and conduct the lightning, which, in its passage to the ground, frequently rends the trunks or branches, and kills any person or animal who happens to be close to it at the time. Instead of seeking protection, then, by retiring under the shelter of a tree, hay-rick, pillar, wall, or hedge, the person should either pursue his way to the nearest house, or get to a part of the road or field which has no high object that can draw the lightning towards it, and remain there until the storm has subsided.

It is particularly dangerous to stand near leaden spouts, iron gates, or palisadoes, at such times; metals of all kinds having so strong an attraction for lightning, as frequently to draw it out of the course which it would otherwise have taken.

When in a house, avoid sitting or standing near the window, door, or walls, during a thunder storm. The nearer a person is to the middle of a room, the better.

The greatest evil to be apprehended from lightning, is the explosion of powder-magazines. These may, in a great degree, be secured from danger by insulation, or by lining the bulk, heads, and floorings, with materials of a non-conducting nature, the expense of which would not be great.

To prevent the effects of excessive cold.

Persons are in danger of being destroyed by cold when they become very drowsy, or are affected with general numbness or insensibility of the body. As the cold which proves fatal, generally affects the feet first, great care should be taken to keep them as warm as possible.

1. By protecting them, when exposed to cold, with wool, or woollen socks, within the shoes or boots, or with large woollen stockings drawn over them; or when riding, with hay or straw wrapped round them.

2. By keeping up a brisk circulation in the blood vessels of the feet, which will be best preserved by avoiding tight boots or shoes, and by moving the feet constantly. When this is impracticable, from a confined situation, and two or more persons are exposed together, let them place their feet, without shoes, against each other's breasts.

If, notwithstanding these precautions, a person should be rendered sleepy or insensible by cold, he must exert himself, and move about quickly; for if he should sleep in the cold, he will inevitably perish.

Hunger and thirst.

In famine life may be protracted with less pain and misery, by a moderate allowance of water; for the acrimony and putrefaction of the humours are obviated by such dilution, and the lungs are furnished with that moisture which is essential to the performance of their functions. Fontanus relates the history of a woman who obstinately refused to take any sustenance, except twice, during the space of 50 days, at the end of which period she died. But he adds, that she used water by way of drink, though in small quantity. Redi, who made many cruel experiments to ascertain the effects of fasting on fowls, observed, that none were able to support life beyond the ninth day, to whom drink was denied; whereas, one, indulged with water, lived more than 20 days. Many other instances might be related of the support of human life, for a time, by water alone.

Indian remedy.

To those who by their occupations are exposed to the dreadful calamity of hunger, it is of serious importance to be instructed in the means of alleviating it. The American Indians use a composition of the juice of tobacco, and the shells of snails, cockles, and oysters calcined, whenever they undertake a long journey, and are likely to be destitute of provisions. The shells are not burnt into quicklime, but only so as to destroy their tenacity, and to render them fit to be powdered. The mass is dried, and formed into pills, of a proper size to be held between the gum and lip, which, being gradually dissolved and swallowed, blunt the sensations both of hunger and of thirst. Tobacco by its narcotic quality, seems well adapted to counteract the uneasy impressions which the gastric juice makes on the nerves of the stomach when it is empty: and the combination of testaceous powders with it tends to correct the secretion that is supposed to be the chief agent in digestion, and which, if not acid, is always attended by acidity. Certain at least it is, that their operation is both grateful and salutary, for we find that the inhabitants of the East Indies mix them with the betel nut, to the chewing of which they are universally and immoderately addicted. Perhaps such absorbents may be usefully applied, both to divide the doses, and to moderate the virulence of the tobacco. For, in the internal exhibition of this plant, much caution is required, as it produces sickness, vertigo, cold clammy sweats, and a train of other formidable symptoms, when taken in too large a quantity.

Other remedies.

That smoking tobacco gives relief to those habitual pains of the stomach which appear to arise from the irritation of the gastric secretions, is well known. The like effect is sometimes produced by increasing the flow of saliva, and swallowing what is thus discharged. Dr. Percival relates the case of a gentleman, who used to masticate, for many hours, daily, a piece of lead: which being neither hard, friable, nor offensive to the palate, suited his purpose, as he thought, better than any other substance. He continued the custom many years, deriving great ease from it, and suffering no sensible injury from the poisonous quality of the metal. On mentioning this fact to a navy surgeon, the Doctor was told, that the sailors, when in hot climates, are wont to mitigate thirst by rolling a bullet in their mouths. When a scarcity of water occurs at sea, Dr. Franklin has advised that the mariners should bathe themselves in tubs of salt-water: for in pursuing the amusement of swimming he observed that, however thirsty he was before immersion, he never continued so afterwards; and that, though he soaked himself several hours in the day, and several days successively in salt-water, he perceived not, in consequence of it, the least taste of saltness in his mouth. He also further suggests, that the same good effect might, perhaps, be derived from dipping the sailor's apparel into the sea; and expresses a confidence that no danger of catching cold would ensue.

Salep and portable soup.

To prevent the calamity of famine at sea, it has been proposed by Dr. Lind, that the powder of salep should constitute part of the provisions of every ship's company. This powder and portable soup, dissolved in boiling water, form a rich thick jelley; and an ounce of each of these articles furnishes one day's subsistence to a healthy, full-grown man. Indeed, salep contains more nutritious matter, in proportion to its bulk, than any other vegetable production now used for food. It has the property also of concealing the nauseous taste of salt-water; and consequently may be of great advantage at sea, when the stock of fresh water is so far consumed, that the mariners are put upon short allowance. By the same mucilaginous quality, it covers the offensiveness, and even in some measure corrects the acrimony of salted and putrescent meats. As a preservative against hunger, salep would be most efficacious, if combined with an equal weight of beef suet. By swallowing little balls of this lubricating compound, at proper intervals, the coats of the stomach will be defended against irritation.

Oils and mucilage.

Oils and mucilages are highly nutritive, of slow digestion, indisposed to pass off by perspiration, and are peculiarly well adapted to support life, in small quantities. The following composition is much extolled by Avicenna, the celebrated Arabian physician. "Take sweet almonds and beef suet, of each one pound, of the oil of violets, two ounces, and of the roots of marsh mallows, one ounce; bray these ingredients in a mortar, and form the mass into boluses, about the size of a common nut."

Relative efficacy of milk and water.

Persons who have been accustomed to animal food, are soon reduced, when supplied only with farinacea. Several years ago, to determine the comparative nutritive powers of different substances, an ingenious young physician made a variety of experiments on himself, to which he unfortunately fell a sacrifice. He lived a month upon bread and water; and under this regimen or diet, he every day diminished much in weight. But, in 1784, a student of physic at Edinburgh, confined himself, for a longer space of time, to a pint of milk and half a pound of white bread, daily: he passed through the usual labours of study and exercise without feeling the least decay of health and strength, and without any sensible loss of bulk. The excretions were very scanty during the whole period; and the discharge of fæces occurred only once a week. In this case the oily and coagulable parts of the milk furnished a larger portion of aliment, than mere water, and at the same time, contributed to check the waste by perspiration and other discharges; for oleaginous substances are retained long in the body by their viscidity.

Gum Arabic, &c.

Gum arabic will be a good substitute for salep in one of the compositions already recommended; and as it will give such firmness to the mass, as to require sucking, (the saliva by this means separated and carried into the stomach,) will further contribute to assuage the sensations both of hunger and of thirst. This gum combined with sugar and the whites of eggs, has been used in France, under the name of *patigumo*, as a remedy for catarrh. These cakes might very well be applied to the purpose of obviating hunger. They are not perishable in the hottest climates, may be carried about the person with convenience, and, though very tough, are pleasant to the taste.—In the following formula by which they are made, the proportion of sugar is too large, and that of gum arabic too small, if the mass be intended to assuage the cravings of appetite.—"Take of fine sugar four ounces, and of gum arabic one ounce; levigate them well together, then add half an ounce of rose water, and of the white of eggs a sufficient quantity, to make into small cakes."

Dr. Pearson's composition.

Dr. Pearson has succeeded after various attempts in forming the following vegetable compound, by which persons engaged in exploring hot and desert regions might be saved from perishing by hunger and thirst. The ingredients are reducible into a very small bulk, and not liable, when mixed, to spoil by keeping.

With a pint of jelly made from starch by boiling-water, mix two ounces of gum arabic and half a drachm of catechu, both previously reduced to powder, and to the whole, add one drachm of crystallized citric acid, also pulverized. Spread the compound upon a clean board or paper, and gradually dry it in an oven of a gentle heat, till it becomes hard and brittle, when it may be broken into pieces of a proper size for being carried in the pocket. Dr. Pearson calculates that two ounces of this compound will sustain life for twenty-four hours—but supposes that during the exertion of travelling, four ounces may be required. So that two pounds would last a person, totally destitute of every other sort of aliment, for eight days.

Another.—The director-general of provisions, in Prussia, M. de Voss, has lately proposed, for the subsistence of armies in the field, a powder, made by the pulverization of farinaceous legumes and dried meats. Every soldier might carry about him a certain quantity of this composition. It would be sufficient to infuse the powder in boiling water, in order to have substantial food.

Means of restoring persons who have been famished.

In our attempts to recover those who have suffered under the calamities of famine, great circumspection is required. Warmth, cordials, and food, are the means to be employed; but it is evident that these may prove too powerful in their operation, if not administered with caution and judgment. For the body, by long fasting, is reduced to a state of more than infantile debility; the minuter vessels of the brain, and of the other organs, collapse for want of food to distend them; the stomach and intestines shrink in their capacity; and the heart languidly vibrates, having scarcely sufficieut energy to propel the scanty current of blood. Under such circumstances, a proper application of heat seems an essential measure, and may be effected, by placing on each side, a healthy man, in contact with the patient. Pediluvia, or fomentation of the feet may also be used with advantrge.

The temperature of these should be lower than that of the human body, and gradually increased according to the effects of their stimulus. New milk, weak broth, or water-gruel, ought to be employed, both for the one and the other; as nourishment may be conveyed into the system this way, by passages, properly the most pervious in a state of fasting, if not too long protracted.

It appears safer to advise the administration of cordials in very small doses, and at first, considerably diluted with either wine or spirits; but—slender wine whey will very well answer this purpose; and afford, at the same time, an easy and pleasant nourishment. When the stomach has been a little strengthened, an egg may be mixed with the whey, or administered under some other agreeable form. The yolk of one was, to Cornaro, sufficient for a meal; and the narrative of that noble Venetian, in whom a fever was excited by the addition of only two ounces of food to his daily allowance, shows, that the return to a full diet, should be conducted with great caution, and by very slow gradations.

Portable corn mill for armies and travellers.

The mill used in Napoleon's army was a small and portable machine, very light, and about the size of a hat. It answered the purpose of grinding two or three bushels a day. In a family its use had better be confined to those who are contented with coarse flour, or meal, since, in obtaining the fine flour, a waste is produced, owing to the clogging. This will not be the case, however, where boys are employed to turn, as the revolution is less rapid, This mill is now much used in England.

INSTRUCTIONS RESPECTING DIET.

Quantity of food.

On the quantity and quality of food, both health and life are dependent. In regulating the quantity, no determinate rules can be prescribed; as it is a point which involves the consideration of a number of circumstances; such as the age, sex, strength, size, and habit of different individuals. But in this, as in all other things, the golden rule of mediocrity is what ought to be observed; and though, in general, nature teaches every creature when it has enough, it is more safe to keep within the bounds of safety than to transgress them. For, what we are accustomed to take daily, in ounces and pounds, cannot be a matter of indifference, in respect either of quantity or quality.

When we take food in too great quantity, or of too nourishing a quality, it will either produce inflammatory diseases, such as pleurisy and apoplexy; or by exhausting the excitability, it will bring on stomach complaints, gout, and all the symptoms of premature old age.

Quality.

All animal substances have a constant tendency to putrefaction; which, beyond a certain degree, is extremely injurious to health. In this class of unwholesome food must be included diseased cattle, and such as die of themselves, the flesh of which ought never be eaten. Even the eating of those which die by accident cannot be wholesome, as the blood being mixed with the flesh must increase the tendency to putrefaction.

No animal can be wholesome which does not take sufficient exercise, and is even excluded from the fresh air. Stall cattle are crammed with gross food, by which, indeed, they increase in bulk; but, in proportion, their flesh is unwholesome; and the very smell of it, when brought to table, is offensive to those who know the qualties of good meat.

Over heating an animal, driving it too fast, throws it in effect, into a temporary fever, often even to a degree of madness; and if it be killed in this situation, the blood is so intimately mixed with the flesh, that it is impossible to separate them; whence, the juices are incapable of affording wholesome nourishment.

It is well known that the practice of filling the cellular membranes with air, or what is called blowing meat, is become very common among butchers. This abominable custom not only renders the meat unfit for keeping, but communicates to it a taint, no less loathsome in idea, than unnatural, and may often be aggravated, for any thing we know to the contrary, by the worst of human effluvia.

Dietic substances.

It is beyond a doubt that animal food, as well as vegetables, are intended by Providence for the subsistence of the human species; and a mixture of the two, where neither of them disagrees with the constitution, is certainly the most proper. Animal food, in general, is more nourishing than vegetables: and when it is not salted, nor hardened by smoking, it is likewise more easy of digestion. On this account, it generally agrees best with delicate and weak constitutions. But a mixture of many kinds of meat at a meal is undoubtedly injurious to the health; both as variety of dishes may tempt to excess, and as a number of meats, very different in their nature, cannot be equally well digested in the same space of time. To eat of one dish only seems most conformable to nature, and is doubtless the means of procuring the most healthy fluids.

Cooking.

The mode of dressing meat has likewise an effect upon its utility and wholesomeness. Flesh that is boiled, is deprived of its nourishing juice, as the gelatinous substance of the meat is extracted into the broth. The latter indeed contains the most nourishing part of it. In the mode of dressing meat by roasting, its juices are less wasted, and as a crust is soon formed on its surface, the nutritive particles are prevented from evaporating. Hence, roasted meat seems likely to yield more nourishment than the same quantity of boiled meat. Stewing is much better calculated to preserve the more substantial parts of the animal feod; for being performed in a close vessel, the juices are neither extracted by water, nor made to evaporate by the heat.

Appetite.

Though appetite for food be the most certain indication, that nature requires a supply, yet, when irregular, it ought never to be indulged beyond a moderate extent. By slow eating, the stomach suffers a very gradual distention, and the food has sufficient time to be duly prepared by mastication, or chewing in the mouth; and he who observes this simple rule will feel himself satisfied, only after he has received a due proportion of aliment; whilst he who swallows his food too quickly, and before it is perfectly chewed, will be apt to imagine he has eaten enough, when the unmasticated provisions merely press on the sides of the stomach; the consequence is that hunger will soon return.

Those who take more exercise in winter than in summer, can also digest more food. But as individuals, leading a sedentary life, usually suffer in winter from a bad state of digestion, owing to a want of exercise, they ought in that season to be more sparing of aliment.

Hunger.

Too little aliment weakens the body, and hastens the consumption of the living principle. After long fasting, the breath is fœtid; and the body becomes disposed to putrid fevers. When a person has suffered much from extreme hunger, much food ought not to be given him at once; for the stomach being contracted and feeble, cannot digest it. He must be supported with liquid nourishment, in small quantities, and be treated in the manner of a patient in a putrid or nervous fever. Hence no animal food of any kind, but vegetables of a mild acid nature, can alone be given with propriety.

Choice of food and drink.

With respect to the choice of aliment those who abound with blood should be sparing in the use of what is highly nourishing, such as fat meat, strong ale, rich wines, and the like. Their diet ought to consist chiefly of the vegetable kind, and their drink ought to be water, cider, perry, or small beer. People, whose solids are weak and relaxed, should avoid every thing that is hard of digestion. A nourishing diet, and a sufficient exercise in the open air, are what in point of health will most avail them. To use freely a nourishing diet, is improper for those who have a tendency to be fat. They ought likewise to be sparing in the use of malt liquors, and to take a good deal of exercise. Those, on the contrary, who are lean, should follow an opposite course. Persons who are troubled with eructations or belchings from the stomach, inclined to putrefaction, ought to live chiefly on acid vegetables; while, on the other hand, people whose food is apt to become sour on the stomach, should make the greater part of their diet consist of animal food. Persons afflicted with nervous complaints, or with the gout, ought to avoid all flatulent food, and whatever is hard of digestion; besides, their diet should be spare, and of an opening nature. The age, constitution and manner of life, are circumstances which merit attention in the choice of proper diet; and sedentary people should live more sparingly than those who are accustomed to much labour. People who are troubled with any complaint, ought to avoid such aliments as have a tendency to increase it. Thus, such as are scorbutic ought not to indulge themselves much in salt provisions; while one who is troubled with the gravel should be cautious in using too much acid, or food of an astringent kind.

The diet ought not to be too uniform, at least for any considerable time. A person, by long accustoming himself to dine only on boiled chicken, one of the most tender kinds of food, will habituate his stomach to such a standard of action, as so become incapable of digesting any thing stronger. But this is an error not very liable to be fallen into voluntarily.

Regularity of meals.

The diet ought not only to be such as is best adapted to the constitution, but likewise be taken at regular periods, for long fasting is hurtful in every stage of life. In young persons, it vitiates the fluids, as well as prevents the growth of the body. Nor is it much less injurious to those more advanced in life; as the humours, even in the most healthy state, have a constant tendency to acrimony; the prevention of which requires frequent supplies of fresh nourishment. Besides, long fasting is apt to produce wind in the stomach and bowels, and sometimes even giddiness, and faintness: though the strong and healthy suffer less from long fasting than the weak and delicate.

All great and sudden changes in diet are universally dangerous; particularly the transition from a rich and full diet to one that is low and sparing. When, therefore, a change becomes expedient, it ought always to be made by degrees.

Heavy suppers.

The practice is not uncommon to eat a light breakfast, and a heavy supper: but the latter of these is hurtful, often producing apoplexy, and always indigestion and nightmare. Where this is not practised, there will generally be found a disposition to make a more hearty breakfast.

Sleep after meals.

It is a disputed point, whether a short sleep after dinner be not useful for promoting digestion; and in several countries the practice certainly is indulged with impunity, if not with evident advantage; besides that it seems to be consistent with the instinct of nature. It is, however only among a certain class that the practice can be used with propriety; and whoever adopts it ought to confine the indulgence to a short sleep of a few minutes. For, if it be continued longer, there arises more loss, from the increase of insensible perspirations, than can be compensated by all the advantages supposed to accrue to digestion.

Those who use such a custom, which may be allowable to the aged and delicate, ought to place themselves in a reclining, not a horizontal posture; because in the latter situation the stomach presses upon a part of the intestines, and the blood is consequently impelled to the head.

Water.

The best water is that which is pure, light, and without any particular colour, taste, or smell. Where water cannot be obtained pure from springs, wells, rivers, or lakes, care should be taken to deprive it of its pernicious qualities by boiling, filtering, but most effectually by distillation. Any putrid substances in the water may be corrected by the addition of an acid. Thus, half an ounce of alum in powder will make twelve gallons of corrupted water pure, and transparent in two hours, without imparting a sensible degree of astringency. Charcoal powder has also been found of great efficacy in checking the putrid tendency of water. To the same purpose, vinegar and other strong acids are well adapted.

Fermented liquors.

Fermented liquors, to prove advantageous to the health, ought not to be too strong; otherwise they hurt digestion, and weaken instead of strengthen the body; for when in that state, and drank in large quantity, they inflame the blood, and dispose to a variety of diseases. A certain degree of strength, however, is necessary to adapt them to most constitutions in cold climates. For, if too weak, they produce wind in the bowels, and occasion flatulencies: or if become stale, they turn sour on the stomach, have a pernicious effect on digestion, and prove otherwise hurtful. If fermented liquors, made for sale, were faithfully prepared, as there is too much reason to believe they are not, and were kept to a proper age, they would, used with moderation, be a comfortable and wholesome beverage; but while they continue to be drank under every circumstance opposite to salubrity, the effects they produce must be more injurious than beneficial to general health.

Quantity of drink.

Whatever kind of drink is used, it ought, as well as food, to be taken always in a just and moderate quantity.

Were we to be governed by the dictates of nature, we ought to drink, only, when solicited by thirst, and to desist when that is satisfied; but as many of our liquors stimulate the palate, this is seldom the case. Pure water is, on this account, an inestimable beverage, as it will not induce us to drink more than is necessary. The season of the year, the state of the weather, and the nature of our food, with the greater or less degree of our exercise, all contribute to render the proportion of drink indeterminate. Thirst, however, is a more certain guide for its own gratification than hunger; and he who is accustomed to drink water only, will be in little danger of transgressing the proper measure, if he drink as often as the calls of nature demand. Persons of a phlegmatic constitution have both less inclination and occasion, to drink, than those of a warm temperament: while the laborious, or those who take much exercise, ought to drink more than the sedentary, and still more in summer than in winter.

To drink immediately before a meal is a practice not to be commended; because the stomach is thereby stretched, and rendered less fit for performing its office. Besides, the gastric juice is by this means too much diluted; and digestion, in consequence, is much obstructed. To drink much during a meal is also liable to objection; the stomach being thus rendered incapable of receiving the due portion of aliment. When the drink is water, a moderate quantity of wine may be used with advantage: but in those whose stomach and bowels are weak, a mixture of wine and malt-liquors is apt to produce flatulence. The mixture of malt-liquors and water, likewise produces wind in the bowels.

Animal and vegetable food.

Fresh meat is the most wholesome and nourishing. But to preserve these qualities, it ought to be dressed in such a manner as to remain tender and juicy. The flesh of tame animals is, upon the whole, preferable to game: for though the latter be in general more mellow and easier of digestion, it does not contain the sweet jelly and mild juices with which the former is commonly impregnated.

Some vegetables are not so easily digested as even hard and tough animal substances; but the flesh of young animals, with a full proportion of wholesome vegetables, the sort which least disagrees with the stomach, is the diet most suitable to man.

Fat, though more nourishing than lean, is not so easy of digestion. On this account it is proper to use with it a sufficient quantity of salt, which conduces greatly to dissolve the fat of meat, and to render it more easy of digestion.

Acids.

In summer, at which season the blood is very much disposed to putrescency, it is advisable to increase the proportion of vegetable food, and to make use of acids, such as vinegar, lemons, oranges, and the like, provided that they do not disagree with the stomach and bowels, which is the case in those constitutions where too much acid is generated in the stomach. This may frequently be known by feeling the sensation of hunger in a painful degree. In such constitutions cold provisions, as well as cold drink, are often preferable to hot.

Qualities of the animal and vegetable food commonly used in diet.

Beef.—When this is the flesh of a bullock of middle age, it affords good and strong nourishment, and is peculiarly well adapted to those who labour, or take much exercise. It will often sit easy upon stomachs that can digest no other kind of food; and its fat is almost as easily digested as that of veal.

Veal is a proper food for persons recovering from indisposition, and may even be given to febrile patients in a very weak state, but it affords less nourishment than the flesh of the same animal in a state of maturity. The fat of it is lighter than that of any other animal, and shows the least disposition to putrescency. Veal is a very suitable food in costive habits; but of all meat it is the least calculated for removing acidity from the stomach.

Mutton, from the age of four to six years, and fed on dry pasture, is an excellent meat. It is of a middle kind between the firmness of beef and the tenderness of veal. The lean part of mutton, however, is the most nourishing and coducive to health; the fat being hard of digestion. The head of the sheep, especially when divested of the skin, is very tender; and the feet, on account of the jelly they contain, are highly nutritive.

Lamb is not so nourishing as mutton; but it is light, and extremely suitable to delicate stomachs.

House lamb, though much esteemed by many, possesses the bad qualities common to the flesh of all animals reared in an unnatural manner.

Pork affords rich and substantial nourishment; and its juices are wholesome when properly fed, and when the animal enjoys pure air and exercise. But the flesh of hogs reared in towns is both hard of digestion and unwholesome. Pork is particularly improper for those who are liable to any foulness of the skin. It is almost proverbial, that a dram is good for promoting its digestion: but this is an erroneous notion; for though a dram may give a momentary stimulus to the coats of the stomach, it tends to harden the flesh, and of course to make it more indigestible.

Smoked hams are a strong kind of meat, and rather fit for a relish than for diet. It is the quality of all salted meat that the fibres become rigid, and therefore more difficult of digestion; and when to this is added smoking, the heat of the chimney occasions the salt to concentrate, and the fat between the muscles sometimes to become rancid.

Bacon is also of an indigestible quality, and is apt to turn rancid on weak stomachs; but for those in health it is an excellent food, especially when used with fowl or veal, or even eaten with peas, cabbages, or cauliflowers.

Goat's flesh is hard and indigestible; but that of kids is tender, as well as delicious, and affords good nourishment.

Venison, or the flesh of deer, and that of hares, is of a nourishing quality, but is liable to the inconvenience, that, though much disposed to putrescency of itself, it must be kept for a little time before it becomes tender.

The blood of animals is used as an aliment by the common people, but they could not long subsist upon it unless mixed with oatmeal, &c.: for it is not very soluble, alone, by the digestive powers of the human stomach, and therefore cannot prove nourishing.

Milk is of very different consistence in different animals; but that of cows being the kind used in diet, is at present the object of our attention. Milk, where it agrees with the stomach, affords excellent nourishment for those who are weak, and cannot digest other aliments. It does not readily become putrid, but it is apt to sour on the stomach, and thence to produce flatulence, heart-burn, or gripes, and in some constitutions a looseness. The best milk is from a cow at three or four years of age, about two months after producing a calf. It is lighter, but more watery than the milk of sheep and goats; while, on the other hand, it is more thick and heavy than the milk of asses and mares, which are next in consistence to human milk.

On account of the acid which is generated after digestion, milk coagulates in all stomachs; but the caseous or cheesy part is again dissolved by the digestive juices, and rendered fit for the purposes of nutrition. It is improper to eat acid substances with milk, as these would tend to prevent the due digestion of it.

Cream is very nourishing, but, on account of its fatness, is difficult to be digested in weak stomachs. Violent exercise, after eating it, will, in a little time, convert it into butter.

Butter.—Some writers inveigh against the use of butter as universally pernicious; but they might with equal reason condemn all vegetable oils, which form a considerable part of diet in the southern climates, and seem to have been beneficially intended by nature for that purpose. Butter, like every other oily substance, has doubtless a relaxing quality, and if long retained in the stomach, is liable to become rancid; but, if eaten in moderation, it will not produce those effects. It is, however, improper in bilious constitutions. The worst consequence produced by butter, when eaten with bread is, that it obstructs the discharge of the saliva, in the act of mastication or chewing; by which means the food is not so easily digested. To obviate this effect, it would be a commendable practice at breakfast, first to eat some dry bread, and chew it well, till the salivary glands were exhausted, and afterwards to eat it with butter. By these means such a quantity of saliva might be carried into the stomach as would be sufficient for the purpose of digestion.

Cheese is likewise reprobated by many as extremely unwholesome. It is doubtless not easy of digestion; and when eaten in a great quantity, may overload the stomach; but if taken sparingly, its tenacity may be dissolved by the digestive juices, and it may yield a wholesome, though not very nourishing chyle. Toasted cheese is agreeable to most palates, but is rendered more indigestible by that process.

Fowls.—The flesh of birds differs in quality according to the food on which they live. Such as feed upon grain and berries, afford, in general, good nourishment; if we except geese and ducks, which are hard of digestion, especially the former. A young hen or chicken is tender and delicate food, and extremely well adapted where the digestive powers are weak. But of all tame fowls, the capon is the most nutritious.

Turkeys, &c.—Turkeys, as well as Guinea or India fowls, afford a substantial nutriment, but are not so easy of digestion as the common domestic fowls. In all birds those parts are the most firm, which are most exercised: in the small birds, therefore, the wings, and in the larger kinds the legs, are commonly the most difficult of digestion.

Wild fowls.—The flesh of wild birds, in general, though more easily digested, is less nourishing than that of quadrupeds, as being more dry on account of their almost constant exercise. Those birds are not wholesome which subsist upon worms, insects, and fishes.

Eggs.—The eggs of birds are a simple and wholesome aliment. Those of the turkey are superior in all qualifications of food. The white of eggs is dissolved in a warm temperature, but by much heat it is rendered tough and hard. The yolk contains much oil, and is highly nourishing, but has a strong tendency to putrefaction; on which account, eggs are improper for people of weak stomachs, especially when they are not quite fresh. Eggs boiled hard or fried are difficult of digestion, and are rendered still more indigestible by the addition of butter. All eggs require a sufficient quantity of salt, to promote their solution in the stomach.

Fish, though some of them be light and easy of digestion, afford less nourishment than vegetables, or the flesh of quadrupeds, and are, of all the animal tribes, the most disposed to putrefaction. Salt water fish are, in general, the best; but, when salted, though less disposed to putrescency, they become more difficult of digestion. Whitings and flounders are the most easily digested. Acid sauces, and pickles, by resisting putrefaction, are a proper addition to fish, both as they retard putrescency, and correct the relaxing tendency of butter, so generally used with this kind of aliment.

Oysters and cockles are eaten both raw and dressed: but in the former state they are preferable, because heat dissipates considerably their nutritious parts as well as the salt water, which promotes their digestion in the stomach; if not eaten very sparingly, they generally prove laxative.

Muscles and periwinkles are far inferior to oysters, both in point of digestion and nutriment. Sea muscles are by some supposed to be of a poisonous nature; but though this opinion is not much countenanced by experience, the safest way is to eat them with vinegar, or some other vegetable acid.

Bread.—At the head of the vegetable class stands bread, that article of diet which, from general use, has received the name of the *staff of life.* Wheat is the grain chiefly used for the purpose in this country, and is among the most nutritive of all the farinaccous kinds, as it contains a great deal of starch. Bread is very properly eaten with animal food, to correct the disposition to putrescency; but is most expedient with such articles of diet as contain much nourishment in a small bulk, because it then serves to give the stomach a proper degree of expansion. But as it produces a slimy chyle, and disposes to costiveness, it ought not to be eaten in a large quantity. To render bread easy of digestion, it ought to be well fermented and baked; *and it never should be used, till it has stood twenty-four hours after being taken out of the oven*, otherwise it is apt to occasion various complaints in those who have weak stomachs; such as flatulence, heart-burn, watchfulness, and the like. The custom of eating butter with bread, *hot from the oven*, is compatible only with very strong digestive powers.

Pastry, especially when hot, has all the disadvantages of hot bread and butter, and even buttered toast, though the bread be stale, is scarcely inferior in its effects on a weak stomach. Dry toast, with butter, is by far the wholesomest breakfast. Brown wheaten bread, in which there is a good deal of rye, though not so nourishing as that made of fine flour, is both palatable and wholesome, but apt to become sour on weak stomachs.

Oats, barley, and rice.—Oats, when deprived of the husk, and particularly barley, when properly prepared, are each of them softening, and afford wholesome and cooling nourishment. Rice likewise contains a nutritious mucilage, and is less used in this country than it deserves, both on account of its wholesomeness and economical utility. The notion of its being hurtful to the sight is a vulgar error. In some constitutions it tends to induce costiveness; but this seems to be owing chiefly to flatulence, and may be corrected by the addition of some spice, such as caraways, aniseed, and the like.

Potatoes are an agreeable and wholesome food, and yield nearly as much nourishment as any of the roots used in diet. The farinaceous or mealy kind is in general the most easy of digestion, and they are much improved by being toasted or baked. They ought almost always to be eaten with meat, and never without salt. The salt should be boiled with them.

Green peas and beans, boiled in their fresh state, are both agreeable to the taste and wholesome: being neither so flatulent, nor so difficult of digestion, as in their ripe state; in which they resemble the other leguminous vegetables. French beans possess much the same qualities; but yield a more watery juice, and have a greater disposition to produce flatulence. They ought to be eaten with some spice.

Salads, being eaten raw, require good digestive powers, especially those of the cooling kind; and the addition of oil and vinegar, though qualified with mustard, hardly renders the free use of them consistent with a weak stomach.

Spinach affords a soft lubricating aliment, but contains little nourishment. In weak stomachs, it is apt to produce acidity, and frequently a looseness. To obviate these effects, it ought always to be well beaten, and but little butter mixed with it.

Asparagus is a nourishing article in diet, and promotes the secretion of urine; but in common with the vegetable class, disposes a little to flatulence.

Artichokes resemble asparagus in their qualities, but seem to be more nutritive, and less diuretic.

Cabbages are some of the most conspicuous plants in the garden. They do not afford much nourishment, but are an agreeable addition to animal food, and not quite so flatulent as the common greens. They are likewise diuretic, and somewhat laxative. Cabbage has a stronger tendency to putrefaction than most other vegetable substances; and, during its putrefying state, sends forth an offensive smell, much resembling that of putrefying animal bodies. So far, however, from promoting a putrid disposition in the human body, it is, on the contrary, a wholesome aliment in the true putrid scurvy.

Turnips are a nutritious article of vegetable food, but not very easy of digestion, and are flatulent. This effect is in a good measure obviated, by pressing the water out of them before they are eaten.

Carrots contain a considerable quantity of nutritious juice, but are among the most flatulent of vegetable productions.

Parsnips are more nourishing and less flatulent than carrots, which they also exceed in the sweetness of their mucilage. By boiling them in two different waters, they are rendered less flatulent, but their other qualities are thereby diminished in proportion.

Parsley is of a stimulating and aromatic nature, well calculated to make agreeable sauces. It is also a gentle diuretic, but preferable in all its qualities, when boiled.

Celery affords a root both wholesome and fragrant, but is difficult of digestion in its raw state. It gives an agreeable taste to soups, as well as renders them diuretic.

Onions, garlic, and shalots are all of a stimulating nature, by which they assist digestion, dissolve slimy humours, and expel flatulency. They are, however, most suitable to persons of a cold and phlegmatic constitution.

Radishes of all kinds, particularly the horse radish, agree with the three preceding articles in powerfully dissolving slimy humours. They excite the discharge of air lodged in the intestines.

Apples are a wholesome vegetable aliment, and in many cases medicinal, particularly in diseases of the breast and complaints arising from phlegm. But, in general, they agree best with the stomach when eaten either roasted or boiled. The more aromatic kinds of apples are the fittest for eating raw.

Pears resemble much in their effects the sweet kind of apples, but have more of a laxative quality, and a greater tendency to flatulence.

Cherries are in general a wholesome fruit, when they agree with the stomach, and they are beneficial in many diseases, especially those of the putrid kind.

Plums are nourishing, and have besides an attenuating, as well as a laxative, quality, but are apt to produce flatulence. If eaten fresh, and before they are ripe, especially in large quantities, they occasion colics, and other complaints of the bowels.

Peaches are not of a very nourishing quality, but they abound in juice, and are serviceable in bilious complaints.

Apricots are more pulpy than peaches, but are apt to ferment, and produce acidities in weak stomachs. Where they do not disagree they are cooling, and tend likewise to correct a disposition to putrescency.

Gooseberries and currants, when ripe, are similar in their qualities to cherries, and when used in a green state they are agreeably cooling.

Strawberries are an agreeable, cooling aliment, and are accounted good in cases of gravel.

Cucumbers are cooling, and agreeable to the palate in hot weather; but to prevent them from proving hurtful to the stomach, the juice ought to be squeezed out after they are sliced, and vinegar, pepper, and salt, afterwards added.

Tea.—By some, the use of this exotic is condemned in terms the most vehement and unqualified, while others have either asserted its innocence, or gone so far as to ascribe to it salubrious, and even extraordinary virtues. The truth seems to lie between these two extremes; there is however an essential difference in the effects of green tea and of black, or of bohea; the former of which is much more apt to affect the nerves of the stomach than the latter, more especially when drank without cream, and likewise without bread and butter. That, taken in a large quantity, or at a later hour than usual, tea often produces watchfulness, is a point that cannot be denied; but if used in moderation, and accompanied with the additions just now mentioned, it does not sensibly discover any hurtful effects, but greatly relieves an oppression of the stomach, and abates pain of the head. It ought always to be made of a moderate degree of strength: for if too weak it certainly relaxes the stomach. As it has an astringent taste, which seems not very consistent with a relaxing power, there is ground for ascribing this effect not so much to the herb itself as to the hot water, which not being impregnated with a sufficient quantity of tea, to correct its own emollient tendency, produces a relaxation, unjustly imputed to some noxious quality of the plant. But tea, like every other commodity, is liable to damage, and when this happens, it may produce effects not necessarily connected with its original qualities.

Coffee.—It is allowed that coffee promotes digestion, and exhilarates the animal spirits; besides which, various other qualities are ascribed to it, such as dispelling flatulency, removing dizziness of the head, attenuating viscid humours, increasing the circulation of the blood, and consequently perspiration; but if drank too strong, it affects the nerves, occasions watchfulness, and tremor of the hands; though in some phlegmatic constitutions it is apt to produce sleep. Indeed, it is to persons of that habit that coffee is well accommodated; for to people of a thin and dry habit of body it seems to be injurious. Turkey coffee is greatly preferable in flavour to that of the West Indies. Drank, only in the quantity of one dish, after dinner, to promote digestion, it answers best without either sugar or milk; but if taken at other times, it should have both; or in place of the latter rather cream, which not only improves the beverage, but tends to mitigate the effect of coffee upon the nerves.

Chocolate is a nutritive and wholesome composition, if taken in a small quantity, and not repeated too often; but is generally hurtful to the stomach of those with whom a vegetable diet disagrees. By the addition of vanilla and other ingredients, it is made too heating, and so much affects particular constitutions as to excite nervous symptoms, especially complaints of the head.

Mineral waters.

Mineral waters, or those impregnated by nature with peculiar qualities, exert a powerful influence on the animal economy when internally used; some by strengthening the constitution, some by purging, and others by increasing the discharges of urine, perspiration, or both. Waters of this kind are to be found in almost every country, and in this island they are numerous.

Malvern water.—The water of this well is chiefly used externally, in painful, and deep-seated ulcerations, the consequence of an internally scrofulous habit, and in some cutaneous disorders; but it is also used with some advantage in painful affections of the kidneys and bladder, attended with the discharge of bloody, purulent, or fœtid urine; the hectic fever produced by scrofulous ulcerations of the lungs; or very extensive and irritating sores on the surface of the body; and also fistulas of long standing, which have been neglected, and become constant and troublesome sores.

The internal use of this water is sometimes attended at first with a slight nausea, and not unfrequently, for the first day or two, it occasions some degree of drowsiness, vertigo, or slight pain of the head, which comes on a few minutes after drinking it. But these symptoms go off spontaneously after a few days, or may readily be removed by a mild purgative. The effects of this water upon the bowels are by no means uniform: very often it purges briskly for a few days; at other times the body is rendered costive by its use, especially in those who are accustomed to the use of malt liquors. In all cases it increases the discharge of the urine, and improves the general health of the patient.

Bristol water.—The sensible effects produced by this water, when fresh from the spring, are, at first, a gentle glow in the stomach, succeeded sometimes by a slight degree of head-ache and giddiness, but which soon go off. In its effects on the kidneys, it nearly resembles the Malvern water, as it does likewise in its operation on the bowels: though, on the whole, a tendency to costiveness is the more general consequence of a continued use of Bristol water; and therefore, the use of a mild laxative is often necessary.

With respect to the manner of employing this water medicinally, the time recommended for the first dose is before breakfast, as early in the morning as the patient chooses to rise, when it is usual to take two glasses; interposing between them half an hour spent in gentle exercise. Two more glasses, with the same interval, are generally given about the middle period between breakfast and dinner; and the water is seldom afterwards repeated in the course of the day. The size of the glass varies from a quarter to half a pint, which last is reckoned a full dose: but it never ought to be taken in such a quantity as to cause any oppression or sense of weight in the stomach.

This water is regarded as beneficial in several disorders of the alimentary canal; in the symptoms of *indigestion* which often afflict Europeans who have resided many years in hot climates; in *bilious diarrhœas* likewise, and in slight *dysenteries*. It has also acquired reputation in the cure of *diabetes*, or at least in affording considerable relief in this malady, But it has, above all, been celebrated in the cure of *consumption of the lungs;* though, on this subject, there is a difference of opinion among medical writers. The season for the Hot Wells is generally from the middle of May to October.

Matlock water.—Matlock water is chiefly used as a *tepid bath*, or at least one which comes to the extreme limits of a cold bath. On this account, it produces but little shock, on immersion, and is therefore well fitted for those in whom the re-action is too weak to overcome the effects of the ordinary cold bath.

Buxton water.—This water is employed largely both in external and internal use; and one of these modes is often applicable in cases where the other would be prejudicial. The great recommendation of the Buxton baths is the copious supply of a very pure water, of the high temperature of 82 deg. As this temperature is several degrees below that of the human body, a slight shock of cold is felt on the first immersion into this bath; but this is almost immediately succeeded by an agreeable glow over the whole body. The cases most relieved by the Buxton water, used externally, are those in which a loss of action, and sometimes even of perfect sensation, has affected the limbs, occasioned by long or violent inflammation, or external injury. Thus, *chronic rheumatism* in all its forms, succeeding to the acute, and where the inflammation, has been chiefly seated in moving parts, is often wonderfully removed by this bath; and the person is so much recovered as to be enabled to use the more powerful remedy of sea-bathing, or the common cold bath. The loss of motion, however, produced by the true palsy, will seldom admit of much relief from these waters.

With regard to the internal use of the Buxton water, it is found of considerable service in cases of *weak digestion*, the consequence of luxurious indulgence. Another class of disorders, much relieved by these waters, is the painful complaint of the *stone and gravel.* The manner of using them is the same as has been mentioned with respect to that of Malvern.

Bath waters.—The stimulating properties of these waters appear to be chiefly exerted in the stomach. When they are likely to prove beneficial, they excite, on being first taken, a pleasing glow in this organ; which is soon succeeded by an increase of appetite and spirits, and a quick determination to the kidneys. On the other hand, when they sit heavy on the stomach, and produce sickness, when they occasion head-ache, thirst, and dryness of the tongue, and do not pass off by urine or perspiration, their operation is unfavourable, and the farther use of them is not to be recommended.

One of the most important uses of the Bath waters, however, is its external application; and, employed in this way, its effects seem to differ in no respect from those of common water, heated to the same temperature, and similarly applied. The cases to which it is peculiarly adapted are mostly of the chronic kind; and by a steady perseverance in this remedy, some very obstinate disorders have given way. The diseases in which they are chiefly beneficial, are *green sickness, rheumatism, gout,* snd some kinds of *palsy.*

Tunbridge water.—The effects of this water are evidently of the stimulating kind. Soon after taking a moderate dose, the pulse rises in strength, and the patient, if previously chilly and pale, feels a degree of glow, occasioned by the increased circulation. Both the appetite, likewise, and the general spirits, are improved; though these effects are much more striking in some than in others, especially in persons of an irritable and sanguine habit. It is however, not uncommon, on beginning the use of the waters, for the patient to be affected with nausea, vomiting, and pain about the region of the stomach; or else a heaviness of the head, slight vertigo, and a sense of fulness over the whole body. Sometimes these symptoms are so constant as to suggest the propriety of renouncing the use of the waters; but in general they are transient, and disappear in a few days, especially when there ensues a permanent increase in any of the natural excretions. When the bowels are foul, and loaded with bilious impurities, the water often purges pretty briskly at first, but this effect ceases as soon as the intestines are cleared. All the preparations of iron, and these waters among the rest, are known to tinge the fœces black, a circumstance in itself of no importance, but of which the patient should be apprized, to prevent him from being affected with any groundless apprehension. The secretion which these waters most commonly excites, is that of urine, and is generally in the greatest quantity where they agree best with the constitution of the patient. Sometimes they, likewise, induce a more perspirable state of the body, especially when the use of them is accompanied with a good deal of exercise.

On the whole, the general operation of these chalybeates is to increase the various secretions in a gradual uniform manner, and at the same time to impart to the body a perceptible increase of vigour and nervous energy. It is, therefore, chiefly in *chronic disorders*, arising from slow beginnings, and attended with laxity and debility of the solids, but without much affection of any of the bowels, that these waters are found to be peculiarly useful. They are of eminent service in cases of *impaired appetite*, slow *digestion*, *flatulent distentions of the belly*, *difficult respiration* arising from sympathy with the stomach, and occasional *vomiting of phlegm*.

Cheltenham water.—The sensible effects produced by this water are generally, on first taking it, a degree of drowsiness, and sometimes head-ache, but which soon goes off spontaneously, even previous to the operation on the bowels. A moderate dose acts powerfully and speedily as a purgative, but without occasioning griping, or producing that faintness and languor which often succeed the operation of the rougher kinds of purges. For this and some other reasons, Cheltenham water may be in most cases persevered in for a considerable length of time without producing any inconvenience to the patient; and during its use the appetite will be improved, the digestive organs strengthened, and the whole constitution invigorated.

This medicinal spring has been found of essential service in the cure of *glandular obstruction*, especially those that affect the liver, and the other organs connected with the functions of the alimentary canal; and it has also great effect in some *cutaneous complaints*, usually termed *scorbutic eruptions*.

The season for drinking the Cheltenham water is during the whole of the summer months. Half a pint of the water is sufficient for a single dose; and this quantity, repeated 3 or 4 times during the day, at proper intervals, is generally enough to produce the desired effect on the bowels.

Scarborough water.—The general effect of this water, when taken in moderation, is to determine gently, to the bowels, rather than to the kidneys, which is the ordinary way in which the simple waters pass off.

With regard to the diseases for which this water may be used with advantage, they are in general the same as those mentioned in the account of the Cheltenham springs. But, in many cases, it would be advisable to increase the purgative effect of this water by adding similar salts, because few stomachs could bear so many pints of this water as would be requisite to produce a full evacuation from the bowels. On this account, it is chiefly as an *alterative*, that the Scarborough water can be employed in its natural state.

Hartfell water.—This chalybeate water issues from the base of a very high mountain of the same name, about five miles from Moffat in Scotland.

It has been found of great service in disorders of the stomach and bowels, *bloody flux*, *bloody urine*, *immoderate flow of the menses*, or their suppression, *fluor albus*, *gleet*, &c. In general, it may be said to promise advantage in all cases where there is a relaxation of the solids. Much benefit has likewise been derived from it, employed both internally and externally, in *old and languid ulcers*, where the texture of the diseased parts is very lax, and the discharge profuse and ill-conditioned.

The dose of this chalybeate is more limited than that of most of the mineral springs. The patient, especially if he be of a delicate and irritable habit, ought to begin with a very small quantity; for an over-dose is apt to be very soon rejected by the stomach, or to occasion griping and disturbance in the intestinal canal. Few patients will bear more than an English pint in the course of the day; but this quantity may be long continued in. It is often of advantage to warm the water for delicate stomachs; and this may be done without injuring its properties.

Harrow-gate, Moffat, and Strathpeffer waters.—The sensible effects produced by these waters, are often a head-ache or giddiness on beginning to use it; with a purgative operation, which is mild, speedy, and seldom attended with pain or griping.

They are used in many disorders of the stomach and intestines, as well as in the derangements of the biliary secretions which so often produce these complaints. It is likewise of great benefit in scrofula, and in various visceral obstructions; but that for which it is most celebrated is its efficacy in curing a number of cutaneous disorders. It is also of advantage in the piles, and in symptoms produced by several species of worms.

This water is generally taken in such doses as to produce a sensible effect on the bowels; for which purpose it is found necessary to take in the morning 3 or 4 glasses, of rather more than half a pint each, at moderate intervals.

To correct the nauseous taste with which it is accompanied, it is not unusual to take some aromatic seeds, sugar comfits, and the like; but Dr. Garnett recommends a small quantity of sea-biscuits or coarse bread, which will remove the taste very speedily, and not cloy the stomach. The water should be taken fresh from the spring, and cold where the stomach can bear it, especially in those cases where the sulphureous ingredient is particularly wanted.

The duration of a course of these waters varies more than that of most other medicinal springs, on account of the great diversity of the diseases in which it is used. Cutaneous complaints of a bad kind are what require the greatest perseverance; and in these the patient ought to drink the water several months at intervals, especially if he perceives any benefit from the use of it during a few weeks.

Sea-water.—The disorders for which sea-water may be used internally are, in general, the same for which all the simple saline waters may be employed, and have been already enumerated. The internal employment of sea-water, however, is chiefly made an auxiliary to its external application, which is now so generally used. It is chiefly recommended in scrofulous affection, and hard indolent tumours in certain glands, particularly those of the neck. In all cases, however, the use of it is almost entirely confined to those periods of the disease when there is no tendency to a hectic fever.

Sea-water should be taken in such doses as to prove moderately purgative; the increase of this evacuation being the peculiar object for which it is employed. About a pint is generally sufficient for the purpose; and this should be taken in the morning at two doses, with an interval of about 1-2 an hour between each. It is seldom necessary to repeat the dose at any other time of the day. But it is often necessary to persevere for a long time in the use of the sea-water; and, happily, this perseverance is seldom productive of any bad consequences to general health. Dr. Russel mentions cases where a pint of this water has been taken daily for 200 mornings, without any interruption, which produced a continued course of moderate purging; yet the appetite continued all this time perfectly good, and the health improved.

To purify water for domestic and other purposes.

This method consists in placing horizontally, in the midst of a common water butt, a false bottom, perforated with a great number of little holes. The butt being thus divided into two equal parts, the upper is filled with pieces of charcoal, which must be neither too large nor too small, thoroughly burned, light, and well washed. Immediately under the cock, by which the water enters the butt, must be placed a small hollow cylinder, being merely to break the force of the water, and prevent it from falling upon the charcoal with such violence as to detach from it any particles of dirt, and wash them through into the lower receptacle; it is of little consequence of what material it is made. This contrivance might be made subservient to the interests of agriculture as well as domestic economy; and would be highly advantageous to provide water thus filtered for the cattle during the whole of the dog-days, and particularly when the ponds and streams are infected by the rotting of hemp and flax.

To make a filtering vessel.

Where water is to be filtered in large quantities, as for the purposes of a family, a particular kind of soft spongy stone, called filtering stones, are employed. These, however, though the water percolates through them very fine, and in sufficient quantity at first, are liable to be obstructed in the same manner as paper, and are then rendered useless. A better method seems to be, to have a wooden vessel lined with lead, three or four feet wide at top, but tapering so as to end in a small orifice at the bottom. The under part of the vessel is to be filled with very rough sand, or gravel, well freed from earth by washing; over this, pretty fine sand may be laid, to the depth of 12 or 14 inches, but this must likewise be well freed from earthy particles.

The vessel may then be filled up to the top with water, pouring it gently in at first, lest the sand should be too much displaced. It will soon filter through the sand, and run out at the lower orifice exceedingly transparent, and likewise, in very considerable quantities. When the upper part of the sand begins to be stopped up, so as not to allow a free passage to the water, it may occasionally be taken off, and the earthy matter washed from it, when it will be equally serviceable as before.

Another.—Take a common garden pot, in the midst of which place a piece of wicker work; on this spread a layer of charcoal of 4 or 5 inches in thickness, and above the charcoal a quantity of sand. The surface of the sand is to be covered with paper pierced full of holes, to prevent the water from making channels in it. This filter is to be renewed occasionally. By this process, which is at once simple and economical, every person is enabled to procure pure limpid water, at a very trifling expense.

Another.—Filter river water through a sponge, more or less compressed, instead of stone or sand, by which the water is not only rendered clear, but likewise wholesome; for sand is insensibly dissolved by the water, so that in 4 or 5 years it will have lost a fifth part of its weight. Powder of charcoal should be added to the sponge when the water is foul, or fetid.

Water for medicinal purposes.

Place an earthen pan in the fields at a considerable distance from the smoke of any town, to catch the rain as it falls from the clouds. The water should be put into perfectly clean bottles, and the corks well secured with wax, and if the bottles are put into a cool place, the water will keep sweet for several years.

To purify the muddy waters of rivers or pits.

Make a number of holes in the bottom of a deep tub; lay some clean gravel thereon, and above this some clean sand; sink this tub into the river or pit, so that only a few inches of the tub will be above the surface of the water; the river or pit water will filter through the sand, and rise clear through it to the level of the water on the outside; and will be pure and limpid.

To preserve fresh water at sea.

Mix 1 1-2 parts of manganese in powder, with 250 parts of water, and agitate every fifteen days. In this way water has been preserved unchanged for seven years. Oxide of manganese has the power, not only of preserving water, but of rendering that sweet which has become putrid.

To purify river or any other water.

Dissolve half an ounce of alum in a pint of warm water, and stir it about in a puncheon of water just taken from the river: all the impurities will soon settle at the bottom, and in a day or two, it will become as clear as the finest spring water.

Method of making putrid water sweet.

Four large spoonsful of unslaked lime put into a puncheon of ninety gallons of putrid water, will, in one night, make it as clear and sweet, as the best spring water just drawn; but unless the water is afterwards ventilated sufficiently to carbonize the lime, it will be a lime water. Three ounces of pure unslaked lime should saturate 90 gallons of water.

Another.—Five drops of sulphuric acid put into a full quart decanter of bad water, will cause the noxious particles to fall to the bottom. Twenty drops of diluted vitriolic acid will answer the same purpose. The water should stand two hours, and then pour off about three parts for use, throw the rest away.

Another.—An ounce and a half of powdered charcoal will be sufficient for the purification of three pints and a half of corrupted water. This discovery has been pretty largely carried into execution, at sea, on long voyages, and with great success. It is necessary to use fresh burnt charcoal, or, at least, that which has been carefully excluded from the atmosphere.

General rules for preserving life and health.

Keep the feet from wet, and the head well defended from cold when in bed:—avoid plentiful meals:—drink moderately of warm and generous, but not inflaming liquors;—go not abroad without breakfast:—shun the night air as you would the plague; and let your bones be kept free from damp by warm fires.—By observing these few and simple rules, better health may be expected than from the use of the most powerful medicines.

Sir R. Philips's rules.

1. Rise early, and never sit up late.
2. Wash the whole body every morning with cold water, by means of a large sponge, and rub it dry with a rough towel, or scrub the whole body for ten or fifteen minutes with flesh brushes.
3. Drink water generally, and avoid excess of spirits, wine, and fermented liquors.
4. Keep the body open by the free use of the syringe, and remove superior obstructions by aperient pills.
5. Sleep in a room which has free access to the open air.
6. Keep the head cool by washing it when necessary with cold water, and abate feverish and inflammatory symptoms when they arise by persevering stillness.
7. Correct symptoms of plethora and indigestion by eating and drinking less per diem for a few days.
8. Never eat a hearty supper, especially of animal food: and drink wine, spirits, and beer, if these are necessary, only after dinner.

Dr. Boerhaave's rules.

This great man, left as a legacy to the world, the following simple and unerring directions for preserving health; they contained the sum and substance of his vast professional knowledge, during a long and useful life:—"Keep the feet warm; the head cool; and the body open;"—If these were generally attended to, the physician's aid would seldom be required.

Clothing.

To adapt the dress with a scrupulous nicety to the fluctuations of temperature every day, would indeed require such minute attention as hardly any person can bestow: but every person may comply with the general rules of clothing, as far as not to lay aside too early the dress of the winter, nor to retain that of the summer too late; from a neglect of which precaution thousands of lives are every year sacrificed to mortality. The perfection of dress, considered merely as such, is to fit without fettering the body.

Flannel.

From a review of the different substances worn next the skin, it would appear that wool has greatly the advantage over the others. Flannel, by its gentle stimulus on the skin, has the beneficial effect of keeping the pores in a state the most favourable to perspiration. In flannel, the discharge by perspiration proceeds uniformly; but not so in linen, when soiled with the moisture of the skin. The different effects of flannel and linen are particularly perceptible during brisk exercise. When the body is covered with the former, though perspiration be necessarily increased, the perspired matter passes off through flannel into the atmosphere or air, and the skin remains dry and warm. If the same exercise be taken in linen shirts, perspiration, as in the former case, is indeed also increased, but the perspired matter, instead of being dispersed into the atmosphere, remains upon the linen, and not only clogs the pores, but gives a disagreeable sensation. Flannel has another advantage which merits attention. As it does not retain the humours discharged from the skin, people who perspire profusely in flannel shirts will not easily catch cold on going into the open air. But the same is not the case in respect of linen shirts, which, by retaining the perspired matter, will occasion a sensation of chilliness, often followed by a violent cold, and sometimes even fatal effects.

The prejudices of people have been much excited, both in favour of flannel and against it. It has been objected, that flannel worn next the skin occasions weakness, by too much increasing perspiration: but this objection seems not to be founded in truth, since perspiration scarcely ever can be immoderate or hurtful, as long as the skin remains dry.

Flannel, when first used, is apt to cause an uneasy sensation, but this soon goes off. In those who wear flannel, the skin, on being much rubbed, will become red and inflamed; but we ought not, on that account, to infer that flannel produces cutaneous eruption; on the contrary, by preserving the pores open, and increasing perspiration, it tends greatly to remove the cause of cutaneous eruptions, which arise chiefly from an irregular state of that discharge through the pores of the skin.

The prejudice against the use of flannel next the skin seems to be owing, in great measure, to the effects which ensue, from not changing it sufficiently often; but this objection is to be imputed to the wearer, not to the flannel itself.

It must be acknowledged, that the advantages above mentioned strongly recommend the use of flannel as a preservative of health, particularly to those who are exposed to all kinds of weather. It has the additional advantage of being suitable to all seasons, and of compensating a deficiency of upper dress. Extraordinary beneficial effects have been experienced from flannel in a variety of cases. In gouty, and, particularly, rheumatic habits, it has operated with singular advantage. In obstinate coughs, where symptoms of consumption were apparent, it has proved highly serviceable; and, upon the whole, it merits a more general and extensive application than it has ever yet obtained.

Stockings.

Cotton stockings, though now generally worn, are far from conducing to the preservation of health, unless frequently changed. For, when once filled with perspirable matter, they do not admit any more to pass through them: but there accumulates a glutinous substance which obstructs the pores of the skin. Silk stockings, likewise, unless worsted be worn under them, retard perspiration. The same may be said of thread stockings. In fact, no stockings are equal to woollen, in regard to supporting perspiration; but taste and fashion cannot readily adopt what common use has depreciated.

Whatever be the form of clothes, garters and all tight bandages should be avoided, as they retard the circulation, and are likewise injurious to the muscles of the parts to which they are applied.

It is a matter of no small importance to keep the feet warm; without which the blood accumulates towards the head, and there is a sensation of coldness over the whole body extremely prejudicial to perspiration.

Hats.

The general voice of antiquity is in favour of the precept that the head should be lightly covered; and, indeed, the covering which nature has given, seems alone sufficient for its protection, except where the hair is extremely thin, or the head bald. By going uncovered in the open air, if dry, the head is strengthened: but to render the practice perfectly safe, it should be begun at an early age. At no age, however, ought a person to go uncovered in sunshine, when the weather is hot, as the consequence may be an inflammation, or some other affection of the brain. Against such accidents black hats afford little defence; for instead of reflecting the heat, they admit the solar rays to act more strongly upon the head. For people who are much in the open air, hats of a white or any other colour would be preferable.

Air.

Nothing is more pernicious than the air of a place where a numerous body of people are collected together within doors; especially if to the breath of the crowd there be added the vapours of a multitude of candles, and the consumption of the vital air by fires in proportion. Hence it happens, that persons of a delicate constitution are liable to become sick or faint in a place of this kind. These ought to avoid, as much as possible, the air of great towns; which is also peculiarly hurtful to the asthmatic and consumptive, as it is likewise to hysteric women, and men of weak nerves. Where such people cannot always live without the verge of great towns, they ought, at least, to go out as often as they can into the open air, and, if possible, pass the night in the wholesomer situation of the suburbs.

Ventilation.

Air that has long stagnated becomes extremely unwholesome to breathe, and often immediately fatal. Such is that of mines, wells, cellars, &c. People ought therefore to be very cautious in entering places of this description which have been long shut up. The air of some hospitals, jails, ships, &c. partakes of the same unwholesome and pernicious nature; and they ought never to be destitute of ventilators—those useful contrivances, for expelling foul, and introducing fresh air into its place. The same may be said of all places where numbers of people are crowded together.

It is found that most plants have the property of correcting bad air within a few hours, when they are exposed to the light of the sun; but that on the contrary, during the night, or in the shade, they corrupt the common air of the atmosphere. Hence it is a dangerous practice to have shrubs in an apartment that is slept in.

Ventilation of churches.

Both in public and private buildings there are errors committed, which affect in an extraordinary degree the salubrity of the air. Churches are seldom open but once a week; they are never ventilated by fires, and rarely by opening the windows: while to render the air of them yet more unwholesome, little or no attention is paid to keeping them clean. The consequence of which is, that they are damp, musty, and apt to prove hurtful to people of weak constitutions; and it is a common remark, that a person cannot pass through a large church or cathedral, even in summer, without a strong sense of coolness.

Ventilation of houses.

The great attention paid to making houses close and warm, though apparently well adapted to the comfort of the inhabitants, is by no means favourable to health, unless care be taken every day to admit fresh air by the windows. Sometimes it may be proper to make use of what is called pumping the room, or moving the door backward and forward for some minutes together. The practice of making the beds early in the day, however it may suit convenience or delicacy, is doubtless improper. It would be much better to turn them down, and expose them to the influence of the air admitted by the windows.

For many persons to sleep in one room, as in the ward of an hospital, is hurtful to health; and it is scarcely a less injurious custom, though often practised by those who have splendid houses, for two or more to sleep in a small apartment, especially if it be very close.

Houses situated in low marshy countries, or near lakes of stagnating water, are likewise unwholesome; as they partake of the putrid vapours exhaled in such places. To remedy this evil, those who inhabit them, if they study their health, ought to use a more generous diet than is requisite in more dry and elevated situations.

Burying in churches, &c.

It is almost every where too common to have church-yards in the middle of populous towns. This is not only reprehensible in point of taste, but, considering how near to the surface of the earth the dead bodies in many places are deposited, there must necessarily arise putrid vapours, which, however imperceptible, cannot fail to contaminate the air. The practice of burying in churches is still more liable to censure; and not many years ago, the pernicious effects of this custom were so severely felt in France, as to occasion a positive edict against it.

Fumigation, &c.

In short, there is nothing in nature so pestilential and destructive as putrid air. Every possible means should be diligently used to prevent it; and where it has once taken place, the most active exertion is necessary to check or extinguish it. If the external air be pure and wholesome, the apartments of a house may generally be kept clear of noxious vapours, by having the windows open for some hours in the day; but in places crowded with inhabitants, and those dirty or diseased, or both, recourse should be had to more powerful means of purification; such as fumigating them with oil of vitriol and nitre, or sprinkling them with vinegar. But of all preservatives from foul air, and consequently from putrid diseases, the most important is cleanliness, in the utmost extent, in persons, in clothes, in houses, and even in the public streets: for it is inconceivable what pestilential effects may follow a great neglect or disregard of this salutary principle, which is not less important in a physical than a moral point of view.

Noxious vapours.

To prevent the effects of noxious vapours from wells, cellars, fermenting liquors, &c. procure a free circulation of air, either by ventilators, or opening the doors or windows where it is confined, or by keeping fires in the infected place; or throwing in lime, recently burnt or powdered.

Old wells, vaults, and sewers, which have been long shut up from the air, are generally occupied by vapours which soon prove fatal to persons breathing them. The property which these vapours have of extinguishing flame, affords the means of detecting their presence, and thereby avoiding the danger of an incautious exposure to them. When such places, therefore are opened to be cleaned out or repaired, a lighted candle should be let down slowly by means of a cord, before any person is suffered to descend; and if it burns freely until it gets to the surface of the water, or other matter covering the bottom, the workmen may then venture down with safety. But, if without any accident, the candle is extinguished, and continues to be so on repeated trials, then the air of the place is highly noxious. In that case, the following means should be employed.

To dissipate noxious vapours in wells, &c.

Procure a pair of smith's bellows, affixed on a wooden frame, so as to work in the same manner as at the forge. This apparatus being placed at the edge of the well, one end of a leathern tube, (the nose of a fire-engine) should be closely adapted to the nose of the bellows, and the other end thrown into the well, reaching within one foot of the bottom.

If the well be even so infected, that a candle will not burn at a short distance from the top; after blowing with the bellows only half an hour, the candle will burn bright at the bottom; then, without further difficulty, proceed in the work.

It is obvious that in cleaning vaults, or working in any subterranean place subject to damps, the same method must be attended with the like beneficial effects.

Persons whose business requires them to attend upon large quantities of fermenting liquors, or to work in close places with lighted charcoal, frequently experience head-ache, giddiness, and other disagreeable effects from the noxious vapours which these exhale, and often have their health impaired, or their lives endangered by a continuance in the employment. In some cases, the danger, perhaps, cannot be avoided, except by going into the open air, as soon as head-ache or giddiness begins, and drinking a glass of cold water, or washing the face and neck with the same. In the case of persons whose work requires charcoal fires, the dangerous effects of it may be prevented, by taking care not to sit near it when burning, or to burn it in a chimney, and when there is none, to keep the door open, and place a large tub of lime water in the room.

To protect gilders, jewellers, and others from the pernicious effects of charcoal.

It is advisable for all those who are exposed to the vapour of charcoal, particularly gilders, jewellers, refiners of metal, &c. to place a flat vessel filled with lime-water, near the stove in which the charcoal is burnt.

The lime strongly attacks the mephitic gas evolved by the ignited charcoal, and preserves the purity of the air. When the surface of the water becomes covered with a film or pellicle, it must be changed for a fresh quantity.

To prevent lamps from proving pernicious to asthmatic persons.

The smoking of lamps is frequently disregarded in domestic life; but the fumes ascending from oil, especially if it be tainted or rancid, are highly pernicious, when inhaled into the lungs of asthmatic persons. To prevent this, let a sponge, three or four inches in diameter, be moistened with pure water, and in that state be suspended by a string or wire, exactly over the flame of the lamp, at the distance of a few inches; this substance will absorb all the smoke emitted during the evening or night, after which it should be rinsed in warm water, by which it will be again rendered fit for use.

To disinfect substancss of the plague.

Chlorine has been successfully used in Spain for this purpose, in the following manner.

Expose four ounces of meat in a saucer, until it becomes nearly putrid: suspend bits of paper, fur, feathers, cotton, silk, and wool, upon hooks fixed in a horizontal piece of wood, attached to a perpendicular one, which is supported by a pedestal of lead; cover the whole with a bell-glass fixed in the rim of a piece of wood on which the saucer is placed. The edges of the rim should be puttied. Fix a cork very tight in the top aperture of the bell-glass, and let the whole rest in a warm room for a fortnight. On withdrawing the cork, the degree of putrefaction may be easily ascertained. When sufficiently impregnated, let each substance be taken out in succession, and enveloped in a sheet of paper folded like a letter: and suspended on a hook in another bell-glass, under which materials for producing chlorine are placed in a saucer or cup. These materials are muriatic acid poured over red oxide of lead, or pulverized oxide of manganese. In a short time the putrid odour will be dispersed, and the papers which are intended to imitate letters supposed to be infected, will smell only of chlorine. Each letter should have three or four parallel incisions made in it with a sharp knife, to admit the disinfecting gas more readily.

To protect gilders from the pernicious effects of mercury.

They should have two doors in their work room, opposite to each other, which they should keep open, that there be a free circulation of air. They should likewise have a piece of gold applied to the roof of the mouth, during the whole time of the operation. This plate will attract and intercept the mercury as they breathe, and when it grows white they must cast it into the fire, that the mercury may evaporate, and replace it when it is cool again. They should, indeed, have two pieces of gold, that one may be put into the mouth whilst the other is purifying and cooling, by these means they will preserve themselves from the diseases and infirmities which mercury occasions.

The health of the poor.

The following extracts from a paper written by Dr. Ferries of Manchester, contain much useful information on the preservation of health in manufacturing and other populous towns.

1. Avoid living in damp cellars: they destroy your constitutions, and shorten your lives. No temptation of low rents can counterbalance their ill effects. You are apt to crowd into the cellars of new buildings, supposing them to be clean. This is a fatal mistake. A new house is always damp for two years, and the cellars, which you inhabit under them, are generally as moist as the bottom of a well. In such places, you are liable to bad fevers, which often throw the patient into a decline; and you are apt to get rheumatic complaints, that continue for a long time, and disable you from working.

2. If you cannot help taking a cellar, be attentive to have all the windows put in good repair before you venture into it; and, if possible, get it white-washed. If you attempt to live in a cellar with broken windows, colds and fevers will be the certain consequences.

3 In many parts of the town you sleep in back rooms, behind the front cellar; rooms, which are dark, and have no circulation of air. It would be much more healthy to sleep in the front part: at least, when you have large families, which is often the case, you ought to divide them, aad not crowd the whole together in the back cellar.

4. Keep your persons and houses as clean as your employment will permit: and do not regret the loss of an hour's wages, when your time is occupied in attending to cleanliness. It is better to give up a little time occasionally, in order to keep your houses neat, than to see your whole family lying sick, in consequence of working constantly without cleaning. It would be of great service, if you could contrive to air your beds and bed-clothes out of doors once or twice a week.

5. Always wash your children from head to foot with cold water, before you send them to work in the morning. Take care to keep them dry in their feet, and never allow them to go to work, without giving them their breakfast, though you should have nothing for them but a crust of bread, and a little water. Children who get wet feet, and when they go

out early fasting, seldom escape fevers or severe colds.

6. When you have reason to believe that any of your neighbours are afflicted with fevers, and that they have not taken care to procure the assistance afforded by the infirmary, you ought, both from a regard to them and to yourselves, to give immediate information.

7. You ought to be very cautious in purchasing old clothes, or second-hand furniture, as they may be brought from houses infected with fever; and you may introduce the infection with them into your own dwellings. Every article of this kind ought to be stoved, or ventillated, before it is admitted into your houses.

8. Your sick neighbours, when the fever gets into their houses, may often require assistance from you. It would be cruel to refuse them, yet it is hard that you should be obliged to expose your health and that of your family. You ought never to visit them for idle curiosity. But when they require your help in making their beds, washing, or turning the sick, you may preserve yourselves from being infected, by tying a handkerchief across your face, just below the eyes, to prevent the exhalations from the bodies of the sick from entering your mouths and nostrils. As soon as you return to your own house, wash your hands and face in cold water, and avoid touching any of your family, for a half, or three quarters of, an hour.

9. Your health will always be materially injured by the following circumstances;—living in small back buildings, adjoining to the open vaults of privies;—or in cellars, where the streets are not properly drained;—or in the narrow bye streets, where sheep are slaughtered, and where the blood and garbage are allowed to stagnate and corrupt; and, perhaps more than all, by living crowded together, in dirty lodging houses, where you cannot have the common comforts of light and air.

10. It is unnecessary to remind you, that much sickness is occasioned among you, by passing your evenings at alehouses.

11. There is scarcely any thing more injurious to the health of children, than allowing them to work at night in the cotton mills. It may not always be in your power to prevent their being employed in this manner; but you should be made acquainted with the danger to which you expose them. There is no hazard incurred by their working during the day, in clean, well managed cotton mills.

12. It is also proper to inform you, that you may be infected with fevers, by working in the same place with persons who have just recovered from fevers, or by people who come from infected houses, where they are at no pains to keep themselves clean. You had better collect something among yourselves, to support such persons for a fortnight after their recovery, than expose yourselves to the risk of catching a fever, by their returning too early to work.

Of exercise.

Exercise strengthens the solids, and promotes the circulation of the fluids beyond any thing else within the compass of nature. Weakness of the nerves, and obstruction of the glands, never fail to accompany a life that is passed in inactivity. What dreadful effects proceed from these two causes, it would be tedious to enumerate. There are very few diseases incident to mankind which inactivity may not produce; and where it has once fixed its residence, it is extremely difficult to expel.

It is not only of itself a plentiful source of disease, but, when become habitual, is generally attended with watchfulness, which, likewise, has a pernicious effect on the health.

Riding and walking.

For preserving health, there is no kind of exercise more proper than walking, as it gives the most general action to the muscles of the body; but, for valetudinarians, riding on horseback is preferable. It is almost incredible how much the constitution may be strengthened by this exercise, when continued for a considerable time; not so much in the fashionable way of a morning ride, but of making long journeys, in which there is the farther advantage of a perpetual change of air. Numbers of people, reduced to a state of great weakness, have, by this means acquired a degree of vigour and health, which all the medical prescriptions in the world could not otherwise have procured. But, it is of importance, in travelling for health, that one should not employ his mind in deep reflections, but enjoy the company of an agreeable companion, and gratify his sight with the prospect of the various objects around him. In this exercise, as well as in every other, we ought always to begin gently, and to finish gradually, never abruptly.

Exercise after meals.

Exercise is hurtful immediately after meals, particularly to those of nervous and irritable constitutions, who are thence liable to heartburn, eructations, and vomiting. Indeed, the instinct of the inferior animals confirms the propriety of this rule: for they are all inclined to indulge themselves in rest after food. At all events, fatiguing exercise should be delayed till digestion is performed, which generally requires three or four hours after eating a full meal.

Different kinds of exercise.

Exercise may be divided into two kinds; namely, the active and the passive. Of the former kind is, walking, running, leaping, riding, swimming, fencing, &c. Of the latter are, riding in a carriage, sailing, friction, &c.

The more active kinds of exercise are best adapted to youth, to those of a middle age, and particularly to the corpulent, and those whose evacutions are not in due proportion to the quantity of food and drink. The passive kinds of exercise, on the contrary, are better suited to infants, to persons advanced far in years, to the delicate and weak, and especially the asthmatic and consumptive.

Reading during a walk.

To read during a walk is a custom improper in itself, and detrimental to the eyes, besides the danger it occasions of falling. This practice not only deprives a person of the principal advantages of a walk, but people thereby accustom themselves to an unsafe and ungraceful manner of carrying the body. It is productive of hurtful consequences to the eyes, because the focus is continually shifted, and the retina thus extremely fatigued.

Dancing.

Dancing, under proper limitations, is a wholesome exercise, especially in winter; but the more violent dances are frequently attended with pernicious effects. The exertion of so many muscles, and the quick inspiration of a warm atmosphere in a crowded assembly, excite such a rapid circulation of the blood, as is equal to that in the hot stage of a fever. When to this we add, the improper use of liquors, which, if of a heating nature, increase the motion of the blood, or if cooling, restrain it abruptly, we can no longer be surprised that spitting of blood and consumption of the lungs are often the consequences of such excesses.

Riding in a carriage.

Riding in carriages is an exercise conducive to health, as the gentle jolts which it affords, promotes the circulation of the blood; but to derive all the good effects from riding in a carriage, the body of it ought not to be too nicely suspended in the straps and springs, nor should the motion be too slow. One of the windows, at least, ought to be kept open, that the perspiration and breath of the several persons inclosed, may not too much vitiate the air.

Sailing.

Of the passive kinds of exercise, sailing is the most efficacious. Those who are unaccustomed to it, generally experience giddiness of the head, nausea, and vomiting; on which account, it is beneficial to an impure stomach. To consumptive patients it is highly advantageous, if they have recourse to it before their disorder is too far advanced to be curable. At all times, however, if there be a spitting of blood, the motion of the vessel must necessarily prove injurious. On the other hand, the relaxed, the nervous, and particularly the hypochondriac, will find, from this kind of exercise, extraordinary benefit.

Reading aloud.

This is a species of exercise much recommended by the ancient physicians; and to this may be joined that of speaking. They are both of great advantage to those who have not sufficient leisure or opportunities for other kinds of exercise. To speak very loud, however, or exercise the voice immediately after a meal, is hurtful to the lungs, as well as to the organs of digestion. Singing, as by the vibratory motion of the air it shakes the lungs and the bowels of the abdomen or belly, promotes, in a remarkable degree, the circulation of the blood. Hence, those sedentary artificers or mechanics, who, from habit, almost constantly sing at their work, unintentionally contribute much to the preservation of their health.

Wind instruments.

All these are more or less hurtful to the lungs, which they weaken, by introducing much air, and keeping that organ too long in a state of distention. On this account, persons of weak lungs, who play much on the flute, hautboy, or French horn, are frequently afflicted with spitting of blood, cough, shortness of breath, and pulmonary consumption. Blowing those instruments likewise checks the circulation of the blood through the lungs, accumulates it towards the head, and disposes such persons to apoplexy.

Friction.

One of the most gentle and useful kinds of exercise, is friction of the body, either by the naked hand, a piece of flannel, or what is still better, a flesh brush. This was in great esteem among the ancients, and is so at present in the East Indies. The whole body may be subjected to this mild operation, but chiefly the belly, the spine, or backbone, and the arms and legs. Friction clears the skin, resolves stagnating humours, promotes perspiration, strengthens the fibres, and increases the warmth and energy of the whole body. In rheumatism, gout, palsy, and green sickness, it is an excellent remedy. To the sedentary, the hypochondriac, and persons troubled with indigestion, who have not leisure to take sufficient exercise, the daily friction of the belly, in particular, cannot be too much recommended as a substitute for other means, in order to dissolve the thick humours which may be forming in the bowels, by stagnation, and to strengthen the vessels. But, in rubbing the belly, the operation ought to be performed in a circular direction, as being most favourable to the course of the intestines, and their natural action. It should be performed in the morning, on an empty stomach, or, rather, in bed, before getting up, and continued, at least, for some minutes at a time.

Standing and sitting.

Standing, though useful as a change after long sitting, is apt to occasion accumulations of blood, or the thinner parts of it, in the lower extremities. Swelled legs are, therefore, common among people of some occupations. It is a posture little calculated to relieve the sedentary; and the body is, at the same time, more fatigued by standing than sitting. The common way of sitting, with the head reclined, is extremely pernicious; for the circulation of the fluids in the belly is thus checked, the intestines are compressed, and the vessels of the breast contracted. The head also suffers by bending it too much forward, the blood being thus carried to it more copiously than is consistent with health. The pressure of the belly may, in a great measure, be provented by high tables and desks, and by raised stools and chairs, upon which a person rather stands than sits.

Getting wet.

This accident is at all times less frequent in towns than in the country, especially since the use of the umbrella has been introduced.

When a person is wet he ought never to stand but to continue in motion till he arrives at a place where he may be suitably accommodated. Here he should strip off his wet clothes, to be changed for such as are dry, and have those parts of his body which have been wetted, well rubbed with a dry cloth. The legs, shoulders, and arms, are generally the parts most exposed to wet: they should, therefore, be particularly attended to. It is almost incredible how many diseases may be prevented by adopting this course. Catarrhs, inflammations, rheumatism, diarrhœas, fevers, and consumptions, are the foremost among the train which frequently follow an accident of this kind.

Precautions in removing from a hot to a cold situation.

It should be a determined rule to avoid all rapid transitions from one extreme to another, and never to remove from a room highly heated, to a fresh or cold air while the body remains warm, or till the necessary change to a warmer dress has been previously made. If, at any time, the body should be violently heated during the warm weather, it is sure to suffer by going into vaults, cellars, ice-houses, by cold bathing, or by sitting on cold stones, or damp earth: many lingering and incurable maladies have been brought on by such imprudence, nay, present death has, in some instances, been the consequence of such transgression. Pulmonary consumption, which makes annually such dreadful ravages among the young and middle aged, has been frequently induced by such apparently trifling causes.

To keep the feet dry.

The only method that has been found to succeed in keeping the feet dry is to wear, over the foot of the stocking, a sock made of oil skin. To keep it in its proper place, it will be necessary to wear over it a cotton or worsted sock. The general health being often disturbed by wet feet, the above directions ought to be generally attended to.

To prevent cold feet at night.

Draw off the stockings, just before undressing, and rub the ankles and feet with the hand as hard as can be borne for five or ten minutes. This will diffuse a pleasurable glow, and those who do so, will never have to complain of cold feet in bed. Frequent washing, and rubbing them thoroughly dry, with a linen cloth or flannel, is useful for the same purpose. In removing from the feet the accumulating dirt that obstructs the pores, we promote health, by facilitating that perspiration which nature intended.

To prevent the effects of drinking cold liquors, in warm weather, or when heated by exercise.

Avoid drinking water whilst warm, or drink only a small quantity at once, and let remain a short time in the mouth before swallowing it, or, wash the hands and face, and rinse the mouth with cold water before drinking. If these precautions have been neglected, and the disorder, incident to drinking cold water, or eating ice when the body is heated, hath been produced, the first, and in most instances, the only remedy to be administered is sixty drops of laudanum in spirits and water, or warm drink of any kind.

If this should fail of giving relief, the same quantity may be given twenty minutes afterwards.

When laudanum cannot be obtained, rum and water, brandy and water, or even warm water alone, should be given.

To remedy the effects of dram-drinking.

Whoever makes the attempt to abandon spirit drinking, will find from time to time, a *rankling in the stomach*, with a sensation of sinking, coldness, and inexpressible anxiety. This may be relieved by taking often, a cupful of an infusion of cloves, made by steeping about an ounce of them in a pint of boiling water for six hours, and then straining off the liquor. In a state of permanent languor and debility, an ounce and a half of the cascarilla bark (being also first bruised in a mortar,) should be added to the infusion. This mixture taken in the quantity above specified, three times a day, will be found an useful strengthener of the stomach and bowels, when they have been disordered by frequent excess and intoxication.

Effects of temperance.

We find, from the registers of the society of Friends or Quakers, that as a consequence of their temperance, one half of those that are born, live to the age of 47 years; whereas Dr. Price tells us, that of the general population of London, half that are born, live only 2 years and three quarters! Among the Quakers, 1 in 10 arrive at 80 years of age, of the general population of London, only 1 to 40. Never did a more powerful argument support the practice of temperance and virtue.

To procure sleep.

Pour a pint of boiling water on an oz. of Epsom salts. Set it to cool, and drink it on going to bed. If still disturbed, count from 1 to 1000. Sleep will generally come on before the person has reached 500.

Or, on going to bed, take a warm-bath;

Or, rub the body well with rough towels or with the flesh-brush for a quarter of an hour. If this does not procure sound sleep, take a tea-spoonful of magnesia in a wine glass of water, with or without a few drops of hartshorn.

To relieve head-ache in bed.

If the head is much disturbed, wash it with cold water, and discontinue the night-cap: but wear worsted stockings in bed.

The air-bath.

All persons, but especially children, ought to resort, at least for a short time *every day*, to this method of enjoying the salubrious influence of that universal agent. Dr. Franklin informs us, that every morning, at day-break, he got out of bed and passed half an hour in his chamber, according to the season, in writing or reading, without any clothes; and this, he adds, seems rather pleasant than otherwise.

To preserve the eye-sight.

Never sit for any length of time in absolute gloom, or exposed to a blaze of light. The reason on which this rule is founded, proves the impropriety of going hastily from one extreme to the other, whether of darkness or of light, and shows us that a southern aspect is improper for those whose sight is weak and tender.

No. 2. Avoid reading small print, and straining the eyes by looking at minute objects.

3. Do not read in the dusk, nor, if the eyes be disordered, by candle light.

4. Do not permit the eyes to dwell on glaring objects, more particularly on first waking in the morning; the sun should not of course be suffered to shine in the room at that time, and a moderate quantity of light, only, should be admitted. For the same reasons, the furniture, walls, and other objects of a bed-room, should not be altogether of a white or glaring colour: indeed, those whose eyes are weak, would find considerable advantage in having green for the furniture, and prevailing colour, of their bed-chambers. Nature confirms the propriety of this fact, for the light of the day comes on by slow degrees, and green is the universal colour she presents to our eyes.

5. Those individuals who are rather long-sighted, should accustom themselves to read with less light, and with the book somewhat nearer to the eye than what they naturally like; while others, that are rather short-sighted, should use themselves to read with the book as far off as possible. By these means, both will improve and strengthen their sight, while a contrary course increases its natural imperfections.

Use of spectacles.

From whatever causes the decay of sight arises, an attentive consideration of the following rules will enable any one to judge for himself, when his eye-sight may be assisted or preserved by the use of proper glasses.

1. When we are obliged to remove small objects to a considerable distance from the eye in order to see them distinctly.

2. If we find it necessary to get more light than formerly, as, for instance, to place the candle between the eye and the object.

3. If, on looking at, and attentively considering a near object, it fatigues the eye and becomes confused, or if it appears to have a kind of dimness or mist before it.

4. When small printed letters are seen to run into each other, and hence, by looking stedfastly on them, appear double or treble.

5. If the eyes are so fatigued by a little exercise, that we are obliged to shut them from time to time, so as to relieve them by looking at different objects.

When all these circumstances concur, or any of them separately takes place, it will be necessary to seek assistance from glasses, which will ease the eyes, and in some degree check their tendency to become worse: whereas, if they be not assisted in time, the weakness will be considerably increased, and the eyes be impaired by the efforts they are compelled to exert.

Plate of green glass.

A piece of green glass, laid flat on a book, will be of the utmost benefit to those who are troubled with weak sight; particularly to those who wish to read, but who are often, in the most interesting parts, perhaps, obliged reluctantly to leave off. A piece of fine clear green glass, about the size of a royal octavo page, will be found of infinitely more assistance than green spectacles. A young gentleman, about the age of 16, was learning the flute, but on account of the weakness of his sight, before he could play a note, he was always obliged to have the music coloured either green or blue; which of course, was attended with much inconvenience, and in some cases, was quite out of the question. He tried green spectacles, but they did not answer the end. Being one day in the garden, he placed a piece of green glass on his book, and found that he could bear to read without the smallest inconvenience: he procured a fine piece, and now can play for an hour with the greatest ease and pleasure.

Cosmetics.

To set off the complexion with all the advantage it can attain, nothing more is requisite than to wash the face with pure water; or, if any thing farther be occasionally necessary, it is only the addition of a little soap.

The teeth.

An object very subservient to health, and which merits due attention, is the preservation of the teeth; the care of which, considering their importance in preparing the food for digestion, is, in general, far from being sufficiently cultivated. Very few persons, comparatively, wash their mouth in the morning, which ought always to be done. Indeed, this ought to be practised at the conclusion of every meal, where either animal food or vegetables are eaten; for the former is apt to leave behind it a rancid acrimony, and the latter an acidity, both of them hurtful to the teeth. Washing the mouth frequently with cold water is not only serviceable in keeping the teeth clean, but in strengthening the gums, the firm adhesion of which to the teeth is of great importance in preserving them sound and secure.

Picking the teeth.

Picking the teeth properly is also greatly conducive to their preservation; but the usual manner of doing this is by no means favourable to the purpose. When it is necessary to pick the teeth, the operation ought to be performed with due care; so as not to hurt the gums; but the safest and best way of doing it is always before a looking-glass.

Tooth-powders.

Many persons, while laudably attentive to preserve their teeth, do them hurt by too much officiousness. They daily apply to them some dentifrice powder, which they rub so hard as not only to injure the enamel by excessive friction, but to hurt the gums even more than by the abuse of the pick-tooth. The quality of some of the dentifrice powders, advertised in newspapers, is extremely suspicious; and there is reason to think that they are not altogether free from a corrosive ingredient. One of the safest and best compositions for the purpose is a mixture of two parts of scuttle-fish bone, and one of the Peruvian bark, both finely powdered; which is calculated not only to clean the teeth without hurting them, but to preserve the firmness of the gums.

Besides the advantage of sound teeth, from their use in mastication, a proper attention to their treatment conduces not a little to the sweetness of the breath. This is, indeed, often affected by other causes, existing in the lungs, the stomach, and sometimes even in the bowels; but a rotten state of the teeth, both from the putrid smell emitted by carious bones, and the impurities lodged in their cavities, never fails of aggravating an unpleasant breath wherever there is a tendency of that kind.

Loose teeth.

When the teeth are loosened by external violence, by falls and blows, or by the improper use of instruments in pulling diseased teeth in the neighbourhood of sound ones, they may again be made tolerably fast by pressing them as firmly as possible into their sockets, and preserving them so with ligatures of cat-gut, Indian weed, or waxed silk, and keeping the patient upon spoon-meat till they are firm. When loose teeth are owing to tartar, nothing will fasten them till the cause be removed; and this ought to be done early, otherwise it will have no effect. Frequently the teeth become loose from a sponginess of the gums, often, but improperly, attributed to scurvy. The best remedy is scarifying the gums deeply, and allowing them to bleed freely; this should be repeated till they are fully fastened. Mild astringents, as tincture of bark, are here attended with good effects, though those of a strong nature will certainly do harm. The mouth should be frequently washed with cold water strongly impregnated with these, and the patient should not use the teeth which have been loose till they become firm again. The loosening of the teeth in old age cannot be remedied, as it is owing to a wasting of their sockets, from which the teeth lose their support.

Foul teeth.

The teeth sometimes become yellow or black without any adventitious matter being observed on them; at other times they become foul, and give a taint to the breath, in consequence of the natural mucus of the mouth, or part of the food remaining too long about them. The most frequent cause of foul teeth is the substance called tartar, which seems to be a deposition from the saliva, and with which the teeth are often almost entirely incrusted. When this substance is allowed to remain, it insinuates itself between the gums and the teeth, and then gets down upon the jaw in such a manner as to loosen the teeth. This, indeed, is by far the most common cause of loose teeth; and when they have been long covered with this or with any other matter, it is seldom they can be cleaned without the assistance of instruments. But when once they are cleaned, they may generally be kept so, by rubbing them with a thin piece of soft wood made into a kind of brush, and dipped into distilled vinegar; after which the mouth is to be washed with common water.

Cleaning the teeth.

When the teeth are to be cleaned by instruments, the operator ought, with a linen cloth or with a glove, to press against the points of the teeth, so as to keep them firm in their sockets, with the fingers of the one hand, while he cleans them with the necessary instruments held in the other; taking care not to scrape them so hard as to loosen them, or to rub off the enamel. This being done, the teeth should be rubbed over with a small brush, or a piece of sponge dipped in a mixture of cream of tartar and Peruvian bark. The same application may be made to the teeth for a few days, when afterwards they may be kept clean as already directed.

The teeth are sometimes covered over with a thin dark coloured scurf, which has by some been mistaken for a wasting of the enamel, but which is only an extraneous matter covering it. By perseverance this may be cleaned off as completely as where the teeth are covered with tartar; but it is apt, after some time, to appear again. When this is observed, the same operation must be repeated.

For the purpose of applying powders or washes to the teeth, a brush or a sponge is commonly employed; the latter is supposed preferable, as being in less danger of wearing down the enamel, or of separating the teeth.

Diseases of the teeth, &c.

The causes producing this may be exposure of the nerve of a tooth, by breaking or wasting of the enamel, inflammation in or about the tooth, or from sympathy, when distant parts are affected, as the eye, the ear, the stomach, or the uterus, as in time of gestation. After tooth-ache has once been produced and removed, it is apt to return by exposure to cold, by taking hot liquids, by hard bodies pressed against the nerve in the time of chewing, by the use of a pick-tooth, &c.

With respect to the *cure* of this disease, no rule can be laid down which will answer with certainty upon all occasions. No remedy has yet been discovered which will at all times even moderate the pain; relief, however, is frequently obtained from acrid substances applied to the tooth, so as to destroy the irritability of the nerves, such as opium, spirit of wine, camphor, and essential aromatic oils. When these fail, blisters behind the ear, or, destroying the nerve by the cautious use of strong acids, or by a red hot wire frequently applied to the part, have been attended with advantage.

When a black or decayed spot appears on a tooth, if it be quite superficial, it may be removed; but if it go through the thickness of the enamel, it will be more advisable to let it remain.

When a small hole breaks out in a tooth, particular attention should be paid to prevent the admission of air. Tin, lead, or gold-leaf, commonly employed for this purpose, sometimes give relief for many months, or even years; but at other times are of little advantage, and in some instances create great pain. When stuffing is to be employed, it ought to be done in the intervals of the fits of toothache, otherwise it will give great uneasiness. When it is to be used, the whole cavity of the tooth should be filled; and this is to be done with a blunt pointed instrument.

To clean and preserve the teeth.

In the morning hold salt in the mouth under the tongue, till it melts or dissolves, and rub the teeth with it. This is, probably, the best application yet known, to cleanse and preserve the teeth.

Eruptions and pimples.

Eruptions and pimples infest those who are addicted to the drinking of strong and heating liquors. It is common to wash them with a little Hungary water, or brandy; but what is better adapted to the purpose is Goulard's vegeto-mineral water. Topical applications, however, are of advantage only when the pimples arise from a local cause: for when they proceed from a vitiated state of the fluids, the eruption cannot be prevented in any other way than by correcting the cause which produces them. In such constitutions the diet ought to be light and cooling, and the body kept gently open.

Warts.

But a more permanent blemish of the face is the kind of excrescence called a *wart*. This proceeds from no general affection of the system, and is merely a local effect. When warts do not prove troublesome, nothing should be done to them, as they generally either fall off or waste gradually away; but when from their size or situation they require to be removed, there are different methods of treating them. If they be pendulous or have narrow necks, a silk thread, waxed, may be tied tight round them at the base, and kept in that situation until they fall off.

When their bases are broad, escharotic applications are commonly made use of; but they ought generally to be of the milder kind. Of these, one of the best is crude sal ammoniac: it should be first moistened in water, and then well rubbed upon the wart two or three times a day. Liquid salt of tartar, and sometimes spirit of hartshorn, have answered the same purpose. Some recommend also the juice of onions, and others that of celandine; but the most effectual application is the tincture of muriated iron, or moistened lunar caustic, applied every day.

To prevent bad toe-nails.

Never cut the nails below the level of the end of the toe; nor ever suffer them to grow much beyond that level. If they grow in at the side, scrape them on the top, and cut them often, both there and at the opposite corner.

To prevent corns.

Wear easy shoes; frequently bathing the feet in luke-warm water, with a little salt or potash dissolved in it. The corn itself may be completely destroyed by rubbing it daily with a little caustic solution of potash, till a soft and flexible skin is formed.

Accidents in general.

There is no situation or condition in human life that is not liable to a great variety of serious accidents, against which it is not always possible to guard by the greatest care and foresight. It is of the utmost importance, therefore, to remember that in every accident, one of the greatest and most powerful assistants in remedying it, is *presence of mind.* For want of this desirable self-possession, many a person has lost his life, and the mischiefs arising from unforeseen accidents have become irretrievable. If the mind be overwhelmed by fear, or astounded by alarm, it is utterly impossible, that deliberate measures can be taken to secure either our own safety or the safety of those who happen to be about us, and in the same predicament with ourselves. We repeat, therefore, that it is a proof of the truest wisdom to cultivate, and endeavour to preserve as much as possible, in all extraordinary and unexpected situations, either of body or mind, or both, that chief requisite in every accident, for acting with coolness, judgment, and effect—*presence of mind.*

To prevent accidents from alarms in theatres.

As no oral communication can, under such circumstances, be heard by an audience, every manager of a theatre should be provided with a large black board, on which he may be able to write any notice or communication which he wishes to make to the audience. It may be added, as a farther caution, that the best security in such cases, is to sit still, till the cause of alarm be thoroughly understood.

To avoid being pressed to death in a crowd.

From pressure on the chest in crowds, the action of the lungs and viscera becomes stopped, the party sinks insensible, and generally dies at the instant. To prevent this, it will be necessary to present the sides to the pressure, and not the chest by any means. There will thus be found little or no inconvenience, far less is the loss of life likely to occur.

To recover lost children.

The following plan for the recovery of lost children cannot be too generally known. Boards are fixed upon each side of the entrance from Cornhill into the Royal Exchange, London, where notices of any child lost or found may be placed, free of expense, at all hours of the day or night; in addition to which a book is kept at the Merchant Seamen's Office, over the Royal Exchange, where copies of the notices may be registered, free of expense, from ten until two o'clock. The notices mention the particulars, viz. whether a boy or a girl, with the name, age, dress, and place where information is to be given.

Thus, is a centre of communication formed between those persons who may have the misfortune to miss their children, and those who may find them.

If the same plan were adopted in every market-town and village throughout the country, it would be productive of general good.

Advice respecting surgical instruments.

Excepting the lancet employed in vaccination, all the instruments used in surgery ought to be dipped in oil, at the moment when they are going to be used: by which method the pain of the person operated upon, will be diminished. It is recommended, also, to make all instruments of a blood-heat a little before the operation.

To detect oxalic acid.

A paragraph has appeared in the newspapers, recommending blue sugar-loaf paper as a test of distinction between oxalic acid and Epsom salt, which have been too often mistaken for each other. It is reddened by the former, but not affected by the latter. This is perfectly true; but a simpler test consists in wetting the tip of the finger, applying it first to the supposed salt, and then to the tongue—if oxalic acid, it tastes *very* sour; if Epsom salt, very bitter and saline.

Another test is to place a drop on the tongue; the acid will be more apparent, and fetor produced by the action of this trivial quantity; the patient will, accordingly, soon find occasion to quell its effects by the saliva or by water.

Most people take physic, not only with their eyes shut, literally, but their senses also, and dread the taste of salts until they have got them fairly down, when in case of mistake, no remedy is at hand. Let the salts, therefore, be mixed with a silver spoon: then wipe it dry, and smell it. If the mixture be really salts nothing will be perceptible, more than if the spoon had been in simple water. But should the spoon have been in a solution of oxalic acid, it will impart a very strong and suffocating smell, so nauseous and filthy, as to leave a lasting impression on the remembrance of the operator.

To try the quality of field-mushrooms.

Take an onion, and strip the outer skin, and boil it with them; if it remains white they are good, but if it becomes blue or black, there are certainly dangerous ones among them.

Means of attaining long life.

In the first place, it may be laid down as a principle, that to be a candidate for long life, one ought to be descended of healthy parents, and possess the rudiments of a good constitution by inheritance. To this must be added good nursing; for the right management of infancy is of great importance in the subsequent stages of life.

To live in a pure and wholesome air is another essential circumstance towards longevity. There are, in most countries, particular situations celebrated for the salubrious quality of the air; but, in general, it is healthful in places where the ground is not wet and swampy, where there are no stagnant waters, and where the dwelling is perfectly dry. If the situation be elevated, or such as has a free ventilation by the winds, it is an additional advantage; and if near the sea, still more healthful. In such situations, it is common for many to live to a great age, who enjoy no other benefits conducive to longevity.

Much depends on wholesome diet for the preservation of health, and consequently for the attainment of long life. It is, however, not necessary to observe great strictness in this article. A mixture of animal and vegetable food is the most proper; but there are many instances of people living to a great age, who confine themselves to the latter. A diet entirely of vegetables, however, does not agree with every constitution, especially the weak and delicate; and those who use it are generally incapable of bearing great exertion, or violent exercise.

Temperance in eating and drinking is very advantageous to the prolongation of life; not a scrupulous exactness in point of quantity or quality, but a general mediocrity in both, and an abstinence from habitual excess. Voluptuousness, however, and luxury, are extremely prejudicial.

Daily exercise, or labour not immoderate, is highly conducive towards the lengthening of life; for, besides their immediate effects on the body, they tend to secure sleep in the night, which is also an essential requisite for the preservation of health. Early rising is a habit generally found amongst those who have attained to a great age. It lays in a fresh stock of health for the consumption of the day; on the transactions of which it seems to have a salutary influence.

Uniformity in the state of the atmosphere, particularly in regard to heat, cold, gravity, and lightless, contributes in a very considerable degree to the duration of life. Countries, therefore, where sudden and great variations in the barometer and thermometer are usual, cannot be favourable to longevity.

Upon the whole it appears, that moderation in every thing, is of the greatest efficacy in prolonging life; which leads to the conclusion, that longevity is intimately connected with habits of virtue.

The true method, then, for procuring length of days is to be careful of health, but without being too anxious; and in every vicissitude of life, endeavour, as much as possible, to preserve tranquillity of mind.

Prevention of, and escape from, fires.

To prevent accidents from leaving a poker in the fire.

Immediately above that square part of the poker, by blacksmiths called the bit, let a small cross of iron be welded, about an inch and a half each way.

The good consequences of this simple contrivance will be,—1st. If the poker, by the fire giving way, should slip out, it will probably catch on the edge of the fender.—2nd. If it should not, it cannot injure the hearth or carpet, as the hot part of the poker will be borne up some inches.—And 3d. The poker cannot be run into the fire further than the bit, which, in regard to a polished poker, is also of some consequence.

Improved mode of extinguishing chamber lights.

By this application, sufficient time and light may be afforded to get into bed with comfort and safety.

Those candlesticks or lamps must be selected for the purpose, which enclose the flame in a glass "chimney" or tube; and which are certainly preferable for general purposes, on account of the steadiness of the flame.

To the upper opening of the glass let a top, or cover of tin or brass be fitted, and when the light is to be put out merely cover up the aperture with it, when the flame will gradually sink, till it is extinguished. Upon the length and diameter of the tube will of course depend the time occupied in the extinction, a circumstance which should be considered by any one about to order the apparatus. It is scarcely necessary to add, that where a candle is used, the cover should be at least three or four inches above the flame, or the extinction will be too sudden. If the cover be provided with a hook, similar to those now fixed on the common extinguishers, it may then be conveniently secured when out of use.—An ingenious instrument has lately been in use, for extinguishing candles:—it is on the principle of a forceps, which being placed so as to embrace the candle near the flame, shuts upon the wick whenever the tallow melts under it.—It may be so placed as to extinguish the candle either in 5 minutes, or in an hour after being put on.

To extinguish fire in chimneys.

Throw, immediately, upon the fire in the grate or range, a large forkful of wet horse litter, from the stable or dunghill. If this be properly managed the steam ascending from the litter will extinguish the flame in the chimney, in less than a minute. Care must be taken that the litter be not so moist as to put out the fire in the grate, and likewise that it be not too dry, for in that case it would break out into flame, and increase instead of lessening the evil. It is likewise necessary to add more, if required, so that the steam may continue to ascend and the fire be entirely extinguished.

This method has not only been found successful when used in the narrow chimneys of towns, but also in the wide, spacious chimneys in the kitchens of country farmers. It is obvious, that any other materials may be used to produce a sufficient body of steam to fill the chimney, provided that they have such a quantity of moisture, as to prevent them from bursting out into a flame.

To extinguish fires effectually.

As soon as the fire engine is in readiness to work, stir into the water, 7 or 8 pounds of pearl-ash, and continue to add the same quantity as occasion requires; taking care that it be directed against the timber or wainscot, &c. just beginning to burn, and not wasted against the brick work. Where time will admit, dissolve any quantity of pearl ash in a vessel of water, and as fast as it dissolves, (which will be in a few minutes) mix a pailful with the water, in the engine, pretty often. Whatever burning wood is played upon, will be extinguished as if it were dipped in water, and will not burn afresh.

To render paper fire-proof.

Whether the paper be plain, written, printed on, or even marbled, stained, or painted, for hangings, dip it in a strong solution of alum water and then thoroughly dry it. In this state it will be fire-proof. This will be readily known by holding a slip, thus prepared, over a candle. Some paper requires to imbibe more of the solution than by a single immersion; in which case the dipping and drying must be repeated, till it becomes fully saturated. Neither the colour nor quality of the paper will be in the least affected by this process, but, on the contrary, will be improved.

Security against fires in manufactories, &c.

This desirable end may be, in a great measure answered, by the introduction of iron staircases. Common ones will be found to be as cheap as any kind of wood, and where ornament is required, they may be made quite as elegant and handsome as those of the most costly materials. Joists, rafters, and beams, cast hollow, of the same metal, may likewise be used, by which means fire cannot be easily communicated from one room to another.

Plate-iron roofs have already been adopted, with more advantage, as to economy, than either tilling, slating, coppering, or leading.

To prevent hay-stacks from taking fire.

Where there is any reason to fear that the hay which is intended to be housed or stacked is not sufficiently dry, let a few handsful of common salt be scattered between each layer. This, by absorbing the humidity of the hay, not only prevents the fermentation, and consequent inflammation of it, but adds a taste to it, which stimulates the appetites of cattle, and preserves them from many diseases.

Fire shields.

Mr. Buckley, of New York, has invented a fire shield, to protect firemen whilst employed in extinguishing fires, but more particularly to prevent fire from spreading. It is made of a metallic substance, thin, light, and impervious to heat, and is of a length and breadth sufficient to cover the whole body; it may likewise be used in several different positions.

When used in the street, it is firmly fixed on a small platform with wheels, and at a small elevation from the ground. The fireman takes his stand on this platform and behind the shield: he is then drawn by ropes near the current of heat and flame; without being scorched or feeling any inconvenience; and with the hose pipe in his hand, he directs the water to the part where it is most required. In this way a line of shields may be formed in close order in front of a powerful heat, behind which, the firemen may stand with safety, and play upon the houses.

To render cloth and wood incombustible.

Mr. Gay Lusac has proposed to render

cloths, stuffs, &c. incombustible by immersing them in solutions of alum, sea salt, &c. But he afterwards considered, that those salts possess this property most eminently, which enter most readily into fusion, being enabled by that means to cover perfectly the fibre of the substances and preserve them from the contact of the air. Guided by this thought, he substituted phosphate of ammonia and borate of soda, for alum, &c. and he found that muslins thus treated could be placed in contact with ignited bodies without danger. They were carbonized but would not inflame.

Another method.

Mr. Cook, of Baskerville house, Birmingham, in a letter to the editor of the Monthly Magazine, dated July, 1822, made the following statement respecting the application of a solution of potash to linens, muslins, and wood; so as to render these articles incombustible. He says, "this is a method of rendering all sorts of cottons, linens, muslins, &c. as well as timber, incombustible. For timber it will be of immense value, as it not only renders it incombustible, but completely prevents the dry-rot from entering into it. For the navy it will be of the utmost importance, inasmuch as all vessels built with timber thus prepared, will be both incombustible and secure from the dry-rot.

"If my invention only went to rendering navy timber incombustible, I cannot help considering it as of infinite importance; because, what scene can there be in the world more dreadful than that of a vessel on fire, far out at sea, and at a distance from all help. I am quite certain that all timber thus prepared will be effectually prevented from being ever set on fire, either by accident or by intention: as well as secure from the dry-rot. But it is not only the navy to whom the discovery will be of advantage; I propose to prepare timber for building houses,—so that a house built with prepared timber, cannot be burnt down; no incendiary can destroy it, nor carelessness or accident affect it, and, the expense of preparing the timber being but small, I am inclined to think that no public building, or, indeed, any house of importance will be built without having the timber first rendered incombustible.

"I not only propose to saturate timber in planks, by letting it remain for a time in the solution; but also when the tree is cut down, (which may be done when the sap is up, and the bark in its best state,) by a machine to drive out, or extract the sap, and saturate the whole tree at once, filling up all the pores with a solution of alkali: this I can effect in a few hours and at a small expense.

"That this discovery will be of importance in saving the lives of many I have no doubt, especially if the ladies can be prevailed upon to adopt it in their dresses, which will only require the dress, after it has been washed and wrung out of the last water to be dipped in a solution of pure vegetable alkali. This solution is as clear as the purest water, and without any smell. But, if there should be any objection to use it in the finest dresses, there can be none to dip all window-curtains and hangings for beds in it; for thousands of accidents have happened, and property been destroyed, as well as many lives lost, by the curtains being set on fire by accident, or carelessness of servants. No accident can ever happen, from this cause, if the curtains are first rendered incombustible; and no family should ever put up curtains liable to be set on fire, without first securing them from its power. I propose, also, to render all the boarded floors of houses incombustible, by washing over every part with this solution after the rooms are cleaned: the servant should wet every part with a proper brush, and this may be always done after the rooms have been cleaned with water, or scoured. Those rooms that are never intended to be wet, should be washed over with the solution several times, in order that the wood may be well saturated,—when the timber of floors will require no farther attention. There is another advantage of some importance, that those will experience who use this preparation,—the bug, an insect so common and troublesome in large towns will not remain in the floors so prepared, nor will they enter into the bedsteads that have been rendered incombustible by this solution.

"I wish particularly to mention its importance in all inns, hotels, &c. where so many persons sleep; for if a fire breaks out in them, how many lives are endangered. This may, now, however, be prevented; for all the rooms, at a small expense, may be rendered safe, and every noxious insect destroyed or driven away.

"I should not at this time have published this statement to the world, but I feel a desire (which I think no one can blame me for, if I am entitled to it,) to claim the merit of having first discovered the important property of the alkalies, in rendering all combustible bodies incombustible, when they are impregnated with them."

That the above method does effectually answer the purposes pointed out by Mr. Cook, the author of this volume is prepared to verify; he, himself, having made the discovery about four years ago. Several friends, at that period, witnessed the effects produced by fire on the incombustible substances. It was his intention to make the discovery public, but he was prevented by other occupations until a more convenient season. He means to arrogate no particular merit to himself, nor to derogate one iota from Mr. Cook's discovery, but in justice to both he is induced to make this statement.

Cautions to females, whose clothes catch fire.

Extraordinary instances sometimes occur of persons, whose clothes have by accident taken fire, escaping, by adopting means suggested at the moment from extraordinary presence of mind. But rather than trust to what presents itself during impressions of extreme terror, to a mind totally unfurnished with any fixed mode of proceeding, it will perhaps be better to lay down certain rules, which being strongly imprinted on the mind. will serve to direct to the most safe and beneficial line of conduct.

1. To call for help, presents itself to the mind instinctively; but this should be done, if possible, by ringing the bell, &c. without opening the door of the apartment, as the external air rushing in, will immediately increase the rapidity of the progress of the flames.

2. The first attempt should be to tear off that part of the clothing which is in flames, and, if in a parlour, to seize the water decanter, (which, for this reason alone, should be large, and kept always full,) or any other vessel of water, which may be in the room where the accident has happened.

3. If unsuccessful in these instantaneous exertions for relief, the unfortunate sufferer should seat herself on the floor, remembering that in this posture, she will be better enabled to smother the flames of her lower garments, and that an upright posture will render the communication of the flames, to the upper part of her dress more probable.

4. In this situation should there be a hearth rug, or carpet, (which even for this use, in this moment of emergency, should form part of the furniture in every room) it will, from the materials of which it is composed, prove highly useful in extinguishing the flames, when laid over the burning clothes, or wrapped tight round them.

5. It has been recommended that persons, whose clothes have caught fire, should immediately roll themselves up in the carpet, but this excellent method of extinguishing the flames is frequently quite impracticable, as it is customary to nail down carpets to the floor, and heavy tables or other furniture are often so placed on the carpet, as to hinder it from being easily rolled up.

6. A by-stander, or the first person who is present, should instantly pass the hand under all the clothes to the sufferer's shift, and raising the whole together, should close them over the head, by which means the flames will indubitably be extinguished. This may be effected in a few seconds, that is, in the time that a person can stoop to the floor, and rise again. In many cases, no other method can be so ready, expeditious, and effectual.

7. The sufferer will facilitate the business, and also prevent serious injury, by covering her face and bosom with her hands and arms. —Should it happen that no person is nigh to assist her, she may, in most cases, if she has the presence of mind, relieve herself, by throwing her clothes over her head, and rolling or laying upon them.

8. The females and children in every family should be told, and shewn, that flame always tends upward—and that, consequently, while they remain in an upright posture, with their clothes on fire (it usually breaking out in the lower part of the dress,) the flames, meeting additional fuel as they rise, become more powerful and vehement in proportion; —whereby the bosom, face, and head, being more exposed than other parts, to this intense vortex of flame, must necessarily be most injured; therefore, in such a situation, when the sufferer is alone, and incapable from age, infirmity, or other cause of extinguishing the flames, by throwing the clothes over the head, as before directed, she may still avoid much torture, and save life, by throwing herself at full length on the floor, and rolling herself thereon.—By this method, the flames may possibly be extinguished; their progress infallibly retarded; the bosom, face, and head, preserved from injury; and an opportunity afforded to wait for assistance.

9. Reasoning on the principle of the ascent of heat and flame, Sir Richard Philips lately provided two separate pieces of muslin, and made with them the following decisive experiment.—He set fire to one of them, held in an upright position, and it was consumed in half a minute, the flames rising with great intensity to the height of about two feet. He then set fire to the other piece, laid in an horizontal direction; this took nearly ten minutes to burn from one end of the piece to the other; the flame never rose half an inch in height, and might at any instant have been extinguished by the thumb and finger, or by drawing the hand over it. From this experiment it is evident that a perpendicular female dress, as high as the monument, would burn out, with a destructive flame, in less time than a single yard of the same material, laid in an horizontal direction.

From this we may perceive, that as soon as a lady's, or child's dress is discovered to be on fire, the sufferer should lie down, when she may then, either extinguish the flame with her own hands, or may leisurely call for assistance, and no fatal effects can happen even in the worst event.

Example.

A lady in Hull, lately, whilst at breakfast, set fire to her clothes, and she was instantly in a blaze; but with admirable presence of mind, she availed herself of this plan:—She laid herself down upon the hearth-rug, and extinguished the fire with ease. Had she run to the door for assistance, she must have been burnt to death: as the fire had destroyed one side of her dress, and had even scorched her eye-lashes before she lay down.

Prevention of this accident.

Females are most commonly the subjects of this terrible accident, owing to their clothing being of a more combustible kind than that of the men; woollen clothes not only burning much slower than linen or cotton, but giving an alarm much sooner by the smell their burning occasions. Females, therefore, whose age or infirmities confine them much to their fire sides, and prevent the hope of any active exertions, should wear gowns and aprons of silk, or stuffs of some fabric in which worsted and silk are blended, instead of muslin and fine linen, which not only will catch fire almost with a spark, but will burn with the utmost rapidity.

Fenders and fire guards.

One of the most evident methods to prevent the clothes from catching fire, is to have wire-fenders placed before the fire-place, of a sufficient height to hinder the coals from flying into the room; such fenders are so placed in some parlours, but more it is believed for protecting the marble hearth and carpet, than for the females and children of the family. Wire screens are sometimes placed in rooms where birds are let loose, parallel to the fire-place; such as these, if more projecting ones should be objected to, might be used in common sitting rooms.

The extinguishing cloth.

A woollen cloth constantly kept in nurseries and sitting-rooms, especially where there are fires, laid loose upon the table or other piece of furniture, being always at hand, might be easily resorted to in case of accident by fire. This being wrapt or pressed tight round a person in flames, would, by excluding the air, in many instances, soon extinguish the fire.

A green baize cloth, which being very pliable, and likewise a neat cover to furniture, is recommended for this purpose; and if such were known in the family by the name of extinguishing cloth, it probably would as readily be used, when there was occasion for it, as fire engines and buckets now are. Care must be taken to procure baize of a close texture. Where the convenience of a baize cloth cannot be easily procured, a cloak or blanket will answer the same purpose. The general opinion respecting the use of carpets in such cases, should not be depended on, as they are frequently nailed to the floor, or incommoded with weighty furniture, so as to prevent instant application.

Immediate treatment of scalds and burns.

Without waiting to undress the patient, let every part that has been touched by the fire or scalding liquid be immersed, as speedily as possible, in cold water; or if it cannot be placed in that liquid, let a copious stream be poured over it, until the clothes are thoroughly cooled. Whilst the dress is removing, by one attendant, another should continue to pour over the sore parts, a quantity of cold water, milk, whey, or any cold liquid that can be soonest procured; but if the skin has given way, beer, vinegar, or any pungent application will but inflame the excoriated flesh. As soon as water can be obtained, it should be applied profusely and without intermission, as the sufferer is undressing, and till the pain has entirely abated. If the injured part cannot be placed in a vessel of water, a single fold of soft linen dipped in it, must be laid over, and not taken off, as it is intended to exclude the air. A large cloth in several folds should be wetted and wrung a little before laying it upon the single fold, and the cold must be kept up by a fresh supply of water. At the end of half an hour, if the pain is quite gone, the application may be discontinued, but on the least return of uneasiness, recourse must again be had to the cold water. The folded wet cloth ought to be changed whenever it begins to get warm —and to keep down the inflammation, it will be necessary to have two napkins, that one may replace the other instantly. Children who have overturned boiling water upon themselves, or who have fallen into tubs of hot wort, by the immediate use of cold water have, within our own knowledge, escaped with only a few small blisters.

To escape from a house on fire.

Provide a rope long enough to reach the ground, with a noose at one end, and with knots tied at intervals of one or two feet, and cause it to be constantly fixed round the bed post or to staples under the window.

Nothing can be more easy in case of danger than, by means of the knots, as resting-places, to slip down such a rope. Every floor, therefore, ought to be provided with such a fire escape, the cost of which will be seldom more than a single shilling. The noose is to be used in letting down children and infirm persons, by placing it round the body, just under the arm-pits.

The next best means of escape, if a person has neglected to provide such a rope, and no other means, either by the stair-case or otherwise, presents itself, is, if he be upon the first, or even the second floor, to throw out his bed and bed clothes into the street, and then to jump upon them. In such a case he must take care to use that window by which he may avoid the area and railings, and to throw the bed in such a place, as he is likely to fall upon, after taking the leap.

Before such means are resorted to, however, the staircase should always be tried, and if not entirely destroyed in any part, or is merely filled with smoke, he can easily descend to the street door, avoiding suffocation by placing his hand over his mouth, and saving himself from being scorched, by wearing a blanket.

Nursery fire escape.

In nurseries, and other rooms where little children sleep, there ought to be provided one or more strong sacks, about three feet and a half in depth, and one and a half in diameter, kept open at the top with a thick wooden hoop, having a long rope fastened to it; into these sacks the children may be put and let down. The person who managers the above, may descend by the knotted fire-escape, or by such other as may be at hand.

Approved fire escape.

Drive a strong staple into the upper part of a window frame, either in one, or in every floor of the house, and provide two blocks, with two or three pullies in each. Now put a rope through each pulley, of a length sufficient to reach the ground from the top of the window. Provide also a strong bag, or sack, of about four feet deep, and eighteen inches wide, with a wooden bottom, and a few hoops to keep the sack open. When an unhappy occasion requires the use of these, let the hoop of the upper block be hung in the staple; then the person or persons must stand in the wooden bottom, draw the sack up about them, and hang the string of the sack on the hook of the under block, when any one person may, with the greatest ease and safety, let another down into the street, and drawing up the sack again, may, in like manner, let down a whole family —women, children, sick, old and infirm; and at last lower himself down by only holding the same open in his own hand.

To prevent steam engines from bursting.

Instead of one, let there be three safety-valves placed at proper distances from each other, over each of which place is a cap of wrought-iron, of the form of a hollow cone, or candle-extinguisher,—the diameter of the base about six or seven inches, and the height fifteen or eighteen inches; each cap to be perforated with fifty or sixty circular holes of about half an inch in diameter, to admit the free escape of the superfluous steam. It is scarcely necessary to add that the caps are to be firmly fixed to the lid of the boiler. It is obvious, from the safety valves being thus secured, that no explosion can take place from the ignorance and carelessness of the person who attends the boiler. To prevent any madman from wilfully causing the explosion, include the caps in the frustum of a hollow cone, of similar metal, the diameter of the base of which should be an inch larger than that of the cap; the smaller end to be two inches in diameter, and its length about the same as that of the cap, and, of course, fixed firmly to the lid of the boiler.

As it is impossible to be too cautious in endeavouring to prevent the explosion of the steam-boiler used by farmers for steaming, by heated steam, potatoes, turnips, &c. and as the danger is increased by the extreme ignorance and thoughtlessness of the boys and servants who attend the boiler, it will be proper to place in the cover, an additional safety-valve, by boring a hole longitudinally through the wooden plug fixed in the opening through which the water is poured into the boiler when wanted. In this hole in the plug, place a wooden peg, or safety-valve, which will operate with more freedom than the original brass safety-valve. Let the lower end of the wooden plug extend four or five inches below the lid of the boiler, and the safety-peg to the bottom of the plug. Thus, having two safety-valves instead of one, it is evident the danger of explosion is diminished one-half at least.

To prevent burglaries.

In addition to the usual precautions of locks and bolts, alarum bells, and fire arms, three things have been found efficacious in preserving houses from nightly depredators. 1st. A *light* in the upper part of the house; 2d. A *small dog*, in a room on the ground floor, which offers the means of its running into a place of safety from its enemies: not to be fed too high, and allowed to sleep by day. 3d. Some *ashes* fresh from the fire-place spread before the door, underneath the window, or other place. Thus the thieves' shoes will creak, the dog will be roused and bark, and the fear of detection by the approach of the light, will deter rogues of common feeling. At least, should they enter, the dog cannot be readily come at to be slain; and the scuffle occasioned by effecting this necessary prelude to robbery, will in almost all cases, promote interruption from within or without.

FARRIERY.

To cure wounds in cattle.

When horses, cattle, or any of our domestic animals are wounded, the treatment may be very simple, and much the same as in the human race. It is extremely improper to follow a practice that is common in many parts of the country among farriers, cow-doctors, and even shepherds—That of applying to the wound, or putting into the sore part, common salt, powder of blue vitriol, or tar, or cloths dipped in spirits, as brandy, rum, &c. or turpentine, or any other stimulant articles; for all such very much increase the pain, and by irritating the sore, may increase the inflammation even to the length of inducing mortification. Though the treatment may be varied according to circumstances, yet, in most cases, it may be sufficient to take notice of the following particulars. It will be proper to wash away any foulness or dirt, about the part, and to examine particularly its condition.

To stop the bleeding.

Should any large blood-vessel be cut, and discharging copiously, it will be right to stop it, by some lint or sponge, with moderate compression, or bandaging, at the same time, and not taking it off for two or three days. Should the pressure fail of effect, caustic applications, such as the lunar caustic, or even the actual cautery, the point of a thick wire, sufficiently heated, may be tried; or, if a surgeon be at hand, the vessel may be taken up by the crooked needle, with waxed thread, and then tied.

Adhesive plaister and sewing.

Where there is no danger of excessive bleeding, and a mere division of the parts, or a deep gash or cut, it will be right to adjust the parts, and keep them together by a strip of any common adhesive plaister; or, when this will not do by itself, the lips of the wound, especially if it be a clean cut, may be closed by one or more stitches, with a moderately coarse needle and thread, which in each stitch may be tied, and the ends left of a proper length, so that they can be afterwards removed when the parts adhere. It is advised to tie the threads, because sometimes the wounded part swells so much that it is difficult to get them cut and drawn out, without giving pain and doing some mischief.

Bandages.

If the part will allow a roller or bandage to be used, to keep the lips of it together, this may likewise be employed; for by supporting the sides of the wound, it would lessen any pain which the stitches occasion. With this treatment the wound heals often in a short time, or in a few days, rarely exceeding five or six, and sooner in the young and healthy, than in the old and relaxed, and sooner in the quiet and motionless, than in the restless and active.

Should the wound be large, and inflammation, with the discharge of matter, likely to take place, it may still be proper, by gentle means, to bring the divided parts near to each other, and to retain them in their natural situation by means of a bandage. This should not be made too tight, but merely to support the part. In this way, and by avoiding stimulant applications, the wound will heal more readily than otherwise, and the chance of any blemish following will be diminished. Washes of spirits, brandy, and the like, Friar's balsam, spirit of wine and camphor, turpentine, or any other such irritating applications, are highly improper, and sometimes make a fresh clean wound, (that would readily heal almost of itself,) inflame, and perhaps mortify, or become a bad sore.

Sores and bruises.

Over the whole sore, or where the part is bruised, or where there is a tendency to suppuration, a poultice should be applied and kept on by suitable bandages. The poultice may be made of any kind of meal, fine bran, bruised linseed, or of mashed turnips, carrots, &c. The following has been found useful as a common poultice: "Fine bran, 1 quart; pour on it a sufficient quantity of boiling water to make a thin paste; to this add of linseed powder enough to give it a proper consistence." The poultice may be kept on for a week or ten days, or even longer, if necessary, changing it once or twice a day; and cleaning the wound, when the poultice is removed, by washing it by means of a soft rag or linen cloth, with water not more than blood warm, (some sponges are too rough for this purpose); or, where the wound is deep, the water may be injected into it by a syringe, in order to clean it from the bottom.

Ointment.

In the course of a few days, when the wound, by care and proper management with the poultices, begins to put on a healthy appearance, and seems to be clean and of a reddish colour, not black or bloody; then there may be applied an ointment made of tallow, linseed oil, bees' wax, and hog's lard, in such proportion as to make it of a consistence somewhat firmer than butter. The ointment should be spread on some soft clean tow, and when applied to the sore, it ought never to be tied hard upon it, (which is done too frequently and very improperly,) but only fixed by a bandage of a proper length and breadth, (for a mere cord is often improper,) so close and securely as to keep it from slipping off. This application may be changed once a day; or when nearly well, and discharging but little, once in two days.

Treatment, according to appearance of the part.

When the wounded part begins to discharge a whitish, thick matter, and is observed to fill up, the general treatment and dressings to the sore, now mentioned, should be continued: and in the course of the cure, the animal, when free of fever, may be allowed better provision, and may take gentle exercise. If the animal be feeble, from the loss of blood originally, or from the long continuance of a feverish state produced by the inflammation attending the wound, or from weakness arising from confinement, or connected with its constitution naturally; and if the wound appear to be in a stationary state, very pale and flabby on its edges, with a thin discharge, then better food may be given to it; and if still no change should be observed, along with the better food, the wound may be treated somewhat differently from what has been already advised. The ointment may be made more stimulant, by adding to it some resin and less bees' wax, or what would be more stimulant still, some common turpentine; for it is only in very rare cases that oil of turpentine can be requisite. The effects of an alteration in the mode of treatment should be particularly remarked, and stimulants should be laid aside, continued or increased, according as may be judged proper. Before changing the dressings applied to the wound, or before rendering them more stimulant and active by using heating applications, the effect of closer bandaging may be tried; for sometimes by keeping the parts a little more firmly together, the cure is promoted.

Food and regimen.

In case of severe wounds, attention should be paid to the condition of the animal in other respects. There being always when such happen a tendency to violent inflammation and fever, that may end fatally, means should be employed to moderate both. The apartment should be cool and airy, and so quiet that the animal should not be disturbed; the drink should not be warm but rather cold, and given freely, though not in too large quantities at a time; the food should be sparingly given and of a poorer quality than usual, and should be rather succulent and laxative, than dry or apt to produce costiveness; bleeding may be employed either generally from a vein, or in some cases, when it can be done, by cupping from the hurt part, as in the case of a bruise (though this last will seldom be requisite or found convenient), and it may be done more than once or twice, as may seem proper; laxative medicines also ought to be given and repeated, as there may be occasion.

Bleeding in general.

Bleeding is often the most useful and efficacious means of curing diseases in horses, &c. In inflammatory affections, it is generally the first remedy resorted to, and its immediate salutary effects are often surprising.

When it is necessary to lessen the whole quantity of blood in the system, open the jugular or neck vein. If the inflammation is local, bleed where it can be conveniently done, either from the part affected, or in its vicinity, as by opening the plate vein, superficial vein of the thigh, or temporal arteries.

In fevers of all kinds, and when inflammation attacks any important organ, as the brain, eyes, lungs, stomach, intestines, liver, kidneys, bladder, &c. bleeding is of the greatest use. It diminishes the quantity of blood in the body; and by this means prevents the bad consequences of inflammation. The quantity of blood to be taken varies according to the age, size, condition and constitution of the horse, and urgency of the symptoms.

From a large strong horse, four or six quarts will generally be requisite, and this may be repeated in smaller quantities if symptoms demand it. The blood, in these diseases, must flow from a large orifice made in the vein. A horse should never be suffered to bleed upon the ground, but into a measure, in order that the proper quantity may be taken. Young horses, also, while shedding their teeth, have sometimes much constitutional irritation, which bleeding relieves. But in these affections it is very rarely necessary to bleed to the same extent as in fevers, &c.; two or three quarts generally suffice to be taken away.

Fulness of blood.

Moderate bleeding, as from two to three or four quarts, is also used to remove fulness of habit, or plethora, attended with slight inflammatory symptoms. In this case the eyes appear heavy, dull, red or inflamed, frequently closed as if asleep; the pulse small, and oppressed; the heat of the body somewhat increased; his legs swell; his hair also rubs off. Horses that are removed from grass to a warm stable, and full fed on hay and corn, and not sufficiently exercised, are very subject to one or more of these symptoms. Regulating the quantity of food given to him, proper exercise, and occasional laxatives, as the following powder, will be commonly found sufficient after the first bleeding, and operation of an aloetic purge. In slight affections of this kind, a brisk purge will often alone be sufficient.

Laxative and diaphoretic powder.

Take of crocus of antimony, finely levigated, nitre, cream of tartar, and flour of sulphur, of each, 4 oz.

Powder and mix them well together for use.

One table spoonful of this mixture may be given every night and morning, in as much scalded bran, or a feed of corn moistened with water, that the powders may adhere thereto. This powder will be found excellent for such horses as are kept on dry meat, whether they be in the stable, or travel on the road; also for stallions in the spring of the year, as they not only keep the body cool and open, but cause him to cast his coat, and make his skin appear as bright as silk.

Purging.

In obstinate grease and swellings of the legs, accompanied with lameness of the joints, dry coughs, worms, diseases of the skin, farcy, apoplexy or staggers, affections of the liver, and several other diseases treated of in this book, mercurial purges are of the greatest service. They purge; destroy worms; generally increase the flow of urine; operate upon the skin, liver, and other viscera in a peculiar manner; cause an healthful action in these parts; and remove many chronic complaints incident to the horse. Great caution is necessary during their operation, lest the horse take cold. The water given him must be warm, and when exercised he should be properly clothed.

Horses that are kept on dry meat, and are full fed, with little or no exercise, require regular purging every six months, with two or three doses each time, allowing proper intervals between each; and those horses which run in stage-coaches, chaises (whose labour is often more than their natural strength is able to bear), and such whose legs are inclined to swell—all require purgative medicines; the use of which would be a means of preventing many of the diseases that attack this useful animal.

To prepare horses for physic.

After violent exercise, horses are liable to lose their appetite, and to have their stomach loaded with crudities and indigested matter; the non-removal of which, by the use of proper physic, is the chief cause why so many die daily. Previously to administering a purge, the body should be prepared.

The proper method of preparing a horse for physic is to give him two or three mashes of the scalded bran and oats, and warm water, for three or four days together. This will soften the fæces, and promote the operation of the medicine. But if a strong purge be given to a horse of costive habit, without preparation, it will probably occasion a violent inflammation.

Purgative balls for horses.

Take of Barbadoes aloes, 7 1-2 oz. Castille soap, 1 1-2 oz. powder ginger, 1 1-2 oz. oil of aniseed, 2 drachms, syrup, a sufficient quantity to make 6 balls, each of which is a dose.

Drink to check over purging.

Take of prepared chalk, ginger, and aniseeds, in powder, each 1 ounce, essential oil of peppermint, 15 drops, rectified spirit of wine, 1-2 an ounce.

Mix the whole in a pint and a half of warm linseed gruel, and give it.

Another.

Take of prepared chalk, 2 ounces, aniseeds, and caraway seeds, in powder, each 1 ounce, opium, 1-2 a drachm. Mix, and give in a pint of linseed gruel.

Astringent drink after looseness.

If the looseness continue, after the above drink has been administered for 2 or 3 days, the following astringent drink may be given.

Take of pomegranate shell, in powder, and prepared testaceous powder, each, 1 oz. Dover's powders, and ginger powdered, each 2 drachms.

Mix, and give in a pint of warm gruel, and repeat twice a day.

Cough drink.

Take of Barbadoes tar, anisated balsam of sulphur, each 1 oz. Incorporate them with the yolk of an egg, then add, nitre, 1 ounce, ginger, 1-2 an ounce, tincture of opium, 1 oz. Mix them together.

Let this drink be gradually mixed in a pint of warm ale or linseed tea, and give it in the morning fasting; let the horse stand without meat for two hours after; then give him a mash of scalded bran and oats and warm water. Repeat every other morning, for three or four times.

Fever ball for horses.

Take of antimonial powder, tartarized antimony, and camphor, each 1 drachm, nitre and Castille soap, each 2 ditto, Barbadoes aloes, 2 drachms.

Mix, and beat them into a ball with syrup of buckthorn.

Let this ball be given to the horse about 2 hours after bleeding; and in six hours after giving him the ball, let him have the following

Purgative drink.

Take of Epsom salts, 4 ounces, nitre, 1-2 an oz. coarse sugar, two table spoonsful.

Dissolve them in a quart of gruel; then add 10 ounces of castor oil. Mix, and give it while new milk warm.

After the first ball is given, the aloes may be left out, and then the ball and drink may be given once a day (one in the morning, and the other in the evening,) until a proper passage be obtained.

Powerful mixture for fevers.

If the fever still continue to increase, it will be proper to take a little more blood from him, and then to have recourse to the following fever powders.

Take of emetic tartar, 1 ounce, calcined antimony, 2 ounces, calcined hartshorn, 1 oz.

Mix and grind them in a mortar to a fine powder; then put them in a bottle for use; 2 drachms of these powders are a proper dose for a horse.

A dose of this powder, with 1 ounce of nitre, may be given twice or three times a day, in a pint of warm gruel, or be made into a ball with conserve of roses. If the fever be violent, and the horse in a raging state, 1-2 an ounce of tincture of opium may be added to each dose of powders.

Drink for an inflammatory fever.

Take of tartar emetic, 1 drachm, prepared kali, 1-2 ounce, camphor, 1 drachm, rubbed into powder, with a few drops of spirit of wine.

This drink is excellent for all kinds of inflammatory fevers; especially such as are attended with imminent danger. It may be given every four hours, or three times a day, in a pint of water-gruel.

Purging ball for jaundice.

Take of Barbadoes aloes, from 4 to 5 drachms, white antimonial powder, and Castille soap, each 2 drachms, calomel, 1 drachm.

Mix, and beat them into a ball, with a sufficient quantity of syrup of buckthorn.

The horse should have a couple of mashes the day before this ball is given, by way of preparation; and the ball should be given fasting the morning following; let him fast for two hours after, then give him a mash of scalded bran and oats, with warm water, and treat him in the same manner as for other physic.

Restorative balls after jaundice.

Take of gentian, and caraway seeds, in powder, of each, 3 ounces, powdered ginger, and precipitated sulphur of antimony, of each 6 drachms, Castille soap, 1 1-2 ounce, and honey, sufficient to form into 6 balls.

One of these balls should be given every other day for some time.

Pectoral balls for broken wind.

Take of Barbadoes tar, Venice turpentine, and Castille soap, each 2 ounces, squills, in powder, 1 ounce, calomel, 3 drachms.

Beat them well together; then add, nitre, 2 oz. aniseeds, and caraway seeds, fresh powdered, of each 1 oz.

Beat them into a mass with honey and liquorice powder, and divide into ten balls.

Alterative balls for surfeit, mange, &c.

Take of precipitated sulphur of antimony, gentian root, and socotrine aloes, each, 1 oz. in fine powder, nitre, 2 ounces, calomel, and cantharides, in powder, each 2 drachms.

Mix and make them into a mass for balls, with honey or treacle. Each ball to weigh 1 ounce and a half.

These balls will be found very useful in many diseases; such as surfeit, hide-bound, mange, grease, or swelled legs, lameness of the joints, molten-grease, inflammation of the eyes, and, indeed, in all lingering and obstinate diseases. One ball may be given every other morning, for a fortnight or three weeks together.

Astringent ball for profuse staleing.

Take of galls and alum, in fine powder, of each, 2 drachms, Peruvian bark, 1-2 ounce.

Make into a ball, with honey or treacle.

It will be proper to repeat this ball every morning, and, if the disease is obstinate, every night and morning, and continue until the urine is diminished to about its natural quantity.

Restorative balls for profuse staleing.

Take of gentian root, in powder, 1-2 an ounce, ginger, powdered, 2 drachms, alum, 1 drachm, treacle, sufficient to make into a ball.

Mercurial ball for worms.

Take of calomel and Castille soap, of each 1 dr. worm-seed, in powder, 1-2 an ounce.

Beat them into a ball with syrup of buckthorn.

This ball should be given at night, and the following drink, or purging ball, the next morning.

Drink for worms.

Take of Barbadoes aloes, from 3 to 6 drachms (according to size and strength,) worm-seed and gentian, in powder, each, 1-2 an ounce, caraway seeds, in powder, 1 ounce.

Mix, and give in a pint of strong decoction of wormwood, and repeat in about 4 or 5 days; but omit giving the mercurial ball after the first time.

Purging ball for the worms.

Take of Barbadoes aloes, 8 drachms, ginger, Castille soap, and oil of savin, each, 2 drachms, syrup of buckthorn, sufficient to make them into a ball.

This purge is calculated for a strong horse; but it may be made weaker, by lessening the quantity of aloes to 6 or 7 drachms, which are, in general, sufficient after a mercurial ball. The horse should have mashes, warm water, and proper exercise.

Stomach drink after the expulsion of the worms.

Take of compound spirit of ammonia, and sweet spirit of nitre, each 1 oz. gentian root, in powder, 1 1-2 oz. Peruvian bark, and hiera picra, in powder, each 1-2 an ounce, horse-spice, 2 ounces.

Mix the whole in three pints of ale, and divide into three parts, and give 1 every morning fasting.

Two hours after, give him a mash and warm water. The virtues of this drink deserve the highest commendation in restoring those horses which have been much reduced by some long-continued disease; as in lowness of spirits; debility, and relaxation of the solids; a loss of appetite; and for such also as are over ridden, either in the field or on the road.

Balls for the staggers.

Take of James' powders, 2 drachms, turmeric, and cream of tartar, each 1-2 an ounce.

Make them into a ball with conserve of roses or honey; a sufficient quantity.

Clyster for convulsions.

Take of linseed, and valerian root, each, 4 ounces, boil them in 3 quarts of water to 4 pints; add, Epsom salts, 4 ounces, assafœtida, 1-2 ounce, opium, 2 dr.

Dissolve the whole in the above while hot, and apply it new milk warm.

This is a most powerful clyster in all disorders of the intestines, that are attended with pain and convulsions, or spasms, in those parts, such as a violent attack of the colic, proceeding from an obstruction in the urinary passage.

To cure gripes in horses.

This disorder goes by different names, in different districts of the country, as fret, from the uneasiness attending it; bots, from its being thought to arise from these animals or worms, &c. The animal looks dull, and rejects his food; becomes restless and uneasy, frequently pawing; voids his excrements in small quantities, and often tries to stale; looks round, as if towards his own flank, or the seat of complaint; soon appears to get worse, often lying down, and sometimes suddenly rising up, or at times trying to roll, even in the stable, &c. As the disorder goes on, the pain becomes more violent, he appears more restless still, kicks at his belly, groans, rolls often, or tumbles about, with other marks of great agitation, becomes feverish, and has a cold moisture at the roots of the ears and about his flanks, and when he lies at rest a little space, begins to perspire strongly, and to get covered with sweat more or less profuse.

In most cases of ordinary gripes, signs of flatulence, or of the presence of air confined in the bowels, occur and constitute a part of the disease, or increase it. The removal of it is, therefore, an object to which the attention of most grooms has been in a chief degree directed; and as it can frequently be got rid of, and the disease cured, by exciting the powerful action of the intestines, cordial and stimulating medicines are had recourse to, and, no doubt, in many have afforded relief. Some farriers, indeed, without much care in distinguishing cases, almost exclusively rely upon such, and employ them too freely. This, however, should not be done: for it sometimes happens, that disorders not unlike flatulent colic or gripes do occur, when there is neither pent up air present, nor any relaxation, or want of energy and action in the intestines themselves, and stimulating medicines might then do no good, but often much mischief.

When the disorder is early discovered, or has newly come on, it will be proper to lose no time to get ready a clyster, and likewise a medicinal draught for removing the wind and abating the pain. After removing with the hand any excrement in the great gut, that can be reached by it, a clyster made of five or six quarts of water, or water-gruel, blood warm, and six or eight ounces of common salt, may be injected: and one or other other of the following draughts may be given, before or about the same time.

Draught for the same.

Take of Venice turpentine, 1 ounce, beat it up with the yolk of an egg, and then add of peppermint water, or even of common water, if the other is not at hand, 1 pint and a half (English measure) and 2 ounces of whiskey or gin. This will serve for one dose.

Another.—Take of table beer, a little warmed, 1 1-2 pints (English); common pepper or powdered ginger, 1 tea-spoonful; gin, whiskey, or rum, from 2 to 4 ounces, or from 1 to 2 glasses full; these mixed together for one dose.

Another.—Oil of turpentine 1 ounce, and water-gruel 1 1-2 pints (English) mixed, for a dose.

These and the like preparations may be given either out of a bottle, or drench-horn, one or two persons raising and keeping properly up the horse's head, while another who administers the medicine, pulls out, and a little aside, the tongue, with his left hand, and with the other pours in the draught.

Further treatment.

Cordial drenches of the kinds recommended, with the clyster, will have effect in ordinary cases to relieve the disorder. But should this not be the case, after waiting an hour or two (longer or shorter according to the severity of the ailment, or the period since its commencement,) then the medicine should be repeated, but in a less dose than at first—perhaps one-half or two-thirds of the former quantity. The horse should be occasionally walked out, properly covered with clothes, lest the chill air bring on shivering, and give rise to feverishness; and his belly should be now and then rubbed a considerable time at once, five or ten minutes, but with intervals of rest, so that it may have time to stale or dung. If the disorder does not yield to these remedies, then others must be employed of a more active nature. Some persons recommend castor oil in the proportion of half a pint to a pint (English,) with an ounce or two of laudanum, or tincture of opium, mixed with water-gruel, in the quantity of a pint English or rather less. In case the horse has lain down, and continued so for some time, and is covered with sweat, when he rises, two or more persons should be employed to rub him dry, and he should also be kept well clothed. The stable should be airy, moderately cool, and his place in it roomy and well-littered, to keep him from hurting himself should he roll about.

White's ball for gripes.

Draughts of liquid medicine operate more speedily than any other form; but as the disorder may attack a horse during a journey, where such cannot readily be procured, Mr. White has given a receipt for a ball for the convenience of those who travel; and if it be wrapped up closely in a piece of bladder, it may be kept a considerable time without losing its power. The ball is composed of the following ingredients, viz. 'Castille soap 3 drachms, camphor 2 drachms, ginger 1 dr. and a half, and Venice turpentine 6 drachms; to be made into a ball for one dose.'

Laudanum draught.

Laudanum may be used in cases of urgency, especially in the wet or lax gripes. Take a quart of beer, and make it a very little warmer than blood heat; then put a table spoonful of powdered ginger into it, and a small wine glassful of laudanum, just before it is given to the horse. This, in most cases, will give ease in a short time; but if the complaint is exceedingly violent, give about half the above quantity again in 15 or 20 minutes. As soon as the pain seems to be abated, if the belly is costive, give the horse a purgative. In case of looseness no purgative must be given, the laudanum, which is of a binding nature, will correct it.

When pain is occasioned by inflammation, it is seldom proper to employ opium, or any medicine of that kind; but when it depends upon spasm, or irritation, no medicines are so beneficial. In inflammation of the bowels, for example, opium would certainly do much injury, but in flatulent or spasmodic colic, or gripes, it seldom fails of success.—*Treatise on Veterinary Medicine.* Vol. II. page 187.

Another anodyne medicine.

When horses are affected with colic, or where the use of anodynes are requisite, the following preparation may be given: namely, opium, 1 drachm, or 60 grains; Castille soap, 2 drachms, and powdered aniseed, half an ounce or 4 drachms; to be made into a ball with syrup, for one dose.

In speaking of the medicines for gripes, or the flatulent colic, sometimes termed *fret*, Mr. White mentions, domestic remedies may be employed when proper medicines cannot be procured in time. For this purpose a draught may be readily made up of a pint of strong peppermint water, with about 4 ounces of gin, and any kind of spice.

Another.—A pint of port wine, with spice or ginger.

Another.—Half a pint of gin diluted with 4 oz. of water and a little ginger.

Another.—Take of Epsom salts, 6 oz. Castille soap, sliced, 2 oz. Dissolve them in 1 1-2 pints of warm gruel; then add, tincture of opium, 1-2 oz. oil of juniper, 2 drachms. Mix, and give them new-milk warm.

This drink may be repeated every four or five hours, till the symptoms begin to abate.

The same when on a journey.

Take of tincture of opium, and oil of juniper, each 2 drachms, sweet spirit of nitre, tincture of benzoin, and aromatic spirit of ammonia, each 1-2 oz. Mix them together in a bottle for one drink, and give it in a pint of warm gruel.

For the colic, flatulency, and colicky pains of the intestines, this drink will be found a valuable cordial. It may be repeated every two hours until the symptoms abate.

Another.—The complaint may be removed by warm beer and ginger, or a cordial-ball, mixed with warm beer.

It is necessary to repeat the caution given respecting the necessity of distinguishing the flatulent, or windy, or spasmodic colic, from the inflammatory one, and from that which depends on costiveness. It is always necessary to empty the bowels by means of clysters; and, should the horse have appeared dull and heavy, previous to the attack, it will be advisable to bleed. If costiveness attends it, give a laxative drench after the paroxysm, which will prevent its return.

To cure surfeit or bad coat in horses.

Take crocus metallorum, or liver of antimony, 1 oz.; sprinkle it with water, or mix it with moist bran. This may be given to horses subject to this disorder once a day, among their oats; it relieves the appetite, destroys worms, sweetens the blood against all obstructions, opens the passages, and improves tired and lean horses in a great degree; it is also of great service in coughs and shortness of breath. It may be given daily from 2 to 4 weeks, and will soon produce a fine coat. The horse may be worked while he is taking the medicine, care being taken not to expose him to wet or cold.

Urine balls for horses.

Mix together, 1 oz. of oil of juniper, 1 oz. balsam of sulphur, 2 oz. of Venice turpentine, 4 oz. of sal prunella, 1 lb. of black rosin.

Melt all together gently, over a slow fire, in an iron pot, and make up into balls of the size of a nutmeg.

Another.—Take of nitre, 3 lbs. resin, 3 lbs. soap, 1 1-2 do. juniper berries, 1 lb. oil of juniper, 1 1-2 oz.

To be made up into balls, of the common size, with spirits of turpentine.

To cure diseases in horses' feet.

Every person may see, upon turning up the bottom of a horse's foot, an angular projection pointing towards the toe, termed the frog and its bars; the remainder, or hollow part, being technically termed the sole, though the entire bottom of the foot might better receive this name. It is certain, however, that "the frog and sole" require pressure—a congenial kind of pressure, without concussion—that shall cause the sensible, inside, or quick-sole, to perform its functions of absorbing the serious particles secreted, or deposited therein, by the blood vessels. If the frog and its bars are permitted to remain in such a state as to reach the ground, wherever the sod happens to be soft, or yielding, the hollow part of the sole receives its due proportion of pressure laterally, and the whole sole, or surface of the foot, is thereby kept in health, or rather, free from canker.

Prevention.

Every veterinarian, of sense, will perceive the necessity of keeping the heels apart; yet, although the immediate cause of their contracting is so universally known and recognised, the injudicious method (to call it by no harsher name) of paring away the frog and sole, which prevents the bars from ever touching the ground, is still continued to an alarming extent.

So much for prevention. When disease comes on, which may be accelerated by two other species of mismanagement, another course is usually followed, not less injudicious than the first mentioned original cause of all the mischief.

Horses' hoofs are of two distinct kinds or shape; the one being oval, hard, dark-coloured and thick, the other round, palish, and thin in the wall, or crust of the hoof. The first have a different kind of frog from the latter; this being broad, thick, and soft, whilst the oval hoof has a frog that is long, acute, and hard. The rags, which hard-work and frequent shoeing occasion on the horny hoof of the round foot, produce ragged frogs also, both being thus pared away to make a fair bottom to receive the shoe (burning hot!) the whole support is so far reduced, and the sensible sole coming much nearer the ground, becomes tender and liable to those painful concussions which bring on lameness—principally of the fore feet. Contraction of those kinds of heels which belong to the cart-horse, and pommice-foot, are the consequence.

The oval foot pertains to the saddle-horse, the hunter, and bit of blood kind, whose bold projecting frogs the farriers remove, and these being compelled to perform long and painful journeys, ever starting or going off with the same leading-leg, and continuing the same throughout, lameness is contracted in that foot, which none can account for, nor even find out whereabout it may be seated. Applications of "the oyls," (that egregious compound of folly, ignorance, and brutality,) follow the first appearance of lameness, and are made alike to the shoulder, the leg, and the sole, under the various pretences of rheumatism strain in the shoulder, and founder. The real cause, however, is not thought of, much less removed; but, on the contrary, the evil is usually augmented, by removing the shoe, and drawing the sole to the quick nearly, in search of suppositious corns, surbatings, &c.—pretended remedies, that were never known to cure, but which might have been all prevented by the simplest precautions imaginable. These are—

1st. Let the frog and sole acquire their natural thickness.—

2d. Lead off sometimes with one leg, sometimes with the other.—

3d. Stuff the hollow of the hoofs (all four of them) with cow-dung, changing it entirely once a day. In every case, it is advisable that he be worked moderately; for it is useless to talk to the owners of horses, about giving the afflicted animal an entire holiday at grass.

Should the proprietor of the beast be a sordid customer, the farrier can expect no fee for such *simple* advice as is here given; so he must procure a phial full of water, and putting therein a little salt-petre, (*nitrated kali of the shops*), and a little *colouring* matter, to be either mixed with the *stuffing*, or to wash the sole clean daily, though the remedy will do as well (nearly) without such addition. A more efficacious auxiliary will be found in procuring a *patch of clay*, to be kneaded on the ground, on which the animal (which is worth so much trouble) may be allowed to stand, and if a small patch be made for each foot, the horse himself will prove their value (in most cases) by feeling for them as it were, and showing by his *manner*, how gratified he is at the coldness they afford to his heated feet. Herein it must be observed, that *stuffing with clay* is not recommended; this being one of the numerous blunders of those farriers, who having found the benefit of any application, or remedy, push it to a ridiculous extremity.

Remedy for lameness in horses.

Mr. Sewell, of the Veterinary College, stated his having discovered a method of curing horses, which are lame in the fore-feet. It occurred to him, that this lameness might originate in the nerves of the foot, near the hoof; and in consequence he immediately amputated about an inch of the diseased nerve, taking the usual precautions of guarding the arteries, and passing ligatures, &c. By this means the animal was instantly relieved from pain, and the lameness perfectly cured.

To cure the thrush in horses' feet.

Simmer over the fire, till it turns brown, equal parts of honey, vinegar, and verdigris, and apply it with a feather or brush occasionally to the feet. The horse at the same time should stand hard, and all soft dung and straw be removed.

Shoeing horses in winter.

In Canada, where the winter is never of a less duration than 5 months, they shoe their horses in the following manner, which serves for the whole winter:—The smith fixes a small piece of steel on the fore part of each shoe, not tempered too hard, which turns up about a 1-4 of an inch, in the shape of a horse's lancet; the same to the hinder part of the shoe, turned up a little higher than the fore-part, tempered in the same manner. In going up a hill, the fore-part gives a purchase that assists the horse, and in going down prevents him sliding forwards.

To prevent the feet of horses from balling with snow.

If the frog in the hoof of horses and the fetlock be cleaned, and well rubbed with soft soap, previously to their going out in snowy weather, it will effectually prevent their falling, from what is termed balling the snow. A number of accidents might be prevented by this simple precaution.

Ointment for the mange.

Take of common turpentine, 1 pound, quicksilver, 4 ounces, hog's lard, 1-2 a pound, flour of sulphur, 4 oz. train oil, 1-2 a pint.

Grind the silver with the turpentine, in a marble mortar, for five or six hours, until it completely disappears: and add a little oil of turpentine to make it rub easier; then add the remainder, and work them all well together till united.

This ointment must be well rubbed on every part affected, in the open air, if the sunshine and the weather be warm; but if it be winter, take the horse to a blacksmith's shop, where a large bar of iron must be heated, and held at a proper distance over him, to warm the ointment.

Liniment for the mange.

Take of white precipitate, 2 ounces, strong mercurial ointment, 2 ounces, sulphur of vivum, 1 pound, flour of sulphur, 1-2 a pound, rape oil, 2 qts.

First grind the white precipitate in a little oil; afterwards add the remainder, taking care that they are well mixed.

This liniment must be well rubbed in with a hard brush, in the open air, provided the day be fine, and the weather warm. If the horse draw in a team, the inside of the collar must be washed, or the inside of the saddle, if a saddle-horse, for the disease is highly contagious.

Eye-water.

Take of camphor, 2 drachms, dissolved in 2 ounces of rectified spirit of wine, Goulard's extract, 1 oz. rose water, 1 quart.

Shake all together in a bottle for use.

Let the eye and the eyelids be well bathed three or four times a day, with a clean linen rag dipped in the eye-water.

For inflammation of the lungs.

Take of white antimonial powder, 2 dr. prepared kali, 1-2 an ounce, nitre, 1-2 an ounce, Castille soap, 2 dr. aromatic confection, 1-2 an ounce.

Beat them into a ball.

This ball must be given to the horse as soon as can be prepared, after he has been bled; and continue it two or three times a day as long as the inflammation continues;—about six hours after, give him a purging drink, and repeat it every night and morning until a passage is obtained, or the bowels are sufficiently opened.

Embrocation for sprains.

Take of soap liniment and camphorated spirit of wine, of each, 8 oz. oil of turpentine, 1-2 an ounce.

Mix, and shake when used.

This evaporating and discutient embrocation is well calculated to remove pain and inflammation, which is generally effected in the course of a fortnight or three weeks; during that time the horse should not be allowed to go out of the stable or farm-yard.

Bracing mixture for sprains.

After the above embrocation, the following bracing mixture must be rubbed on the part once a day.

Take of Egyptiacum, 2 oz. oil of turpentine, 1 oz.

Shake well together; then add, camphorated spirit of wine, and compound tincture of benzoin, each 1 oz. vinegar, 11 oz.

Mix, and shake well together every time they are used.

Paste to stop bleeding.

Take of fresh nettles, 1 handful, bruise them in a mortar; add, blue vitriol, in powder, 4 oz. wheaten flour, 2 oz. wine vinegar, 1-2 oz. oil of vitriol, 1-2 oz.

Beat them all together into a paste.

Let the wound be filled up with this paste, and a proper pledget of tow laid over the mouth, in order to prevent it from falling out, and then bandage it on with a strong roller. This dressing must remain in the wound 10 or 12 hours.

Ointment for scratched heels.

Take of hog's lard, 1 pound, white lead, 4 oz. alum, in fine powder, 2 oz. white vitriol, 1 oz. sugar of lead, 1-2 oz. olive oil, 3 oz.

Grind all the powders in a marble mortar with the oil, or on a marble slab; then add the lard, and work the whole together till united.

This is a neat composition, and very proper to keep in the stable during the winter; it will not only be found useful for greasy and scratched heels, but also for stubs and treads of every description. A small quantity must be rubbed on the part affected every night and morning, in slight cases; but in treads, or wounds upon the heels, it will be best to spread the ointment on pledgets of tow, and secure them with bandages.

Ointment for greasy heels.

Take of white ointment, 1 pound, white vitriol, blue vitriol, and sugar of lead, in powder, each 1-2 oz.

Mix well together.

This ointment, when used, must be spread on strong brown paper, and applied over the part that greases, and bandaged on with listing. He may, after dressing, be turned into a dry straw-yard, and a few diuretic balls given to him; one may be given every third day. Once dressing is in general sufficient to perform a cure; if not, it may be repeated in a week after.

Astringent embrocation for strains in different parts.

Take of camphor, 2 drachms, dissolved in 1-2 an oz. of strong rectified spirit of wine, nitre, 1 ounce, dissolved in 1-2 a pint of wine vinegar, spirits of turpentine, 4 ounces, white lead, or bole armenic, in powder, 1-2 ounce, aqua fortis, 1 ounce.

Mix, and shake them all together in a bottle for use.

Mixture for canker in the mouth.

Take of wine vinegar, 1-2 a pint, burnt alum, and common salt, each 1 ounce, bole armenic, 1-2 ounce.

Mix, and shake them together in a bottle for use.

It will be proper to dress the horse's mouth with this mixture, every morning and evening, in the following manner. Take a small cane, or a piece of whalebone, half a yard long, and tie a linen rag, or a little tow, round one end; then dip it into the mixture, and pass it up his mouth, and gently remove it to all the affected parts: let him champ it well about in his mouth: after which let him fast an hour, then give meat as usual.

Purging ball for dogs.

Take of jalap, in powder, 1 scruple, Barbadoes aloes, 1 drachm, ginger, in powder, 10 grains, conserve of hips, or syrup, enough to form a ball.

Ointment for the mange.

Take of quicksilver, 3 ounces, balsam of sulphur, 2 ounces, oil of turpentine, 3 ounces, soft soap, 1 pound, Cape aloes, in powder, 1-2 ounce.

Rub the quicksilver with the balsam of sulphur, in a marble mortar for three or four hours, or until the globules completely disappear; and while rubbing keep gradually adding the oil of turpentine; having done this, you may then mix the whole well together for use. It must be well rubbed in on the affected parts, every third day, for three or four times.

Liniment for the mange.

Take of flour of sulphur, 4 ounces, sulphur of vivum, 4 ounces, white precipitate, 1 ounce, strong mercurial ointment, 1 ounce, Cape aloes, in powder, 1-2 ounce, neats-foot oil, 1 1-2 pint.

First rub the powders together in a mortar; then put in the ointment, and gradually add the oil; it must be stirred when used. The affected parts must be well anointed with this liniment, every third day, for three or four times.

Mercurial liniments for the red mange.

Take of mild mercurial ointment, 4 ounces, oil of turpentine, 3 ounces, Cape aloes, in powder, 1-2 an ounce.

Mix well together, and anoint the parts every third day for 3 or 4 times. Many sportsmen have their dogs regularly dressed with this liniment two or three weeks before the hunting season commences; it is supposed to improve their scent, and make them more fit for the chase.

Mild ointments for the mange.

Take of oil of vitriol, 1-2 an ounce, hog's lard, 8 ounces. Mix and anoint the dog every day for three or four times, or oftener if required.

This ointment is used in surfeit, and slight cases of mange.

Lotion for the mange.

Take of white hellebore root, bruised, 2 ounces, water, 3 pints, boil down to 2 pints and strain, sal ammoniac, 2 dr. sublimate, 1 dr. Cape aloes, 1-2 an ounce.

Dissolve the sal ammoniac, and other ingredients, in the decoction.

This lotion is sometimes used to cure the mange, when greasy applications are objected to.

Distemper in dogs.

The following prescriptions are each about a dose for a full-grown pointer. They must, of course, be increased or diminished in proportion to the size and strength of the dog.

Take of opium, 3 grains, emetic tartar (an invaluable medicine) 5 grains. To be given at night.

Repeat the dose every third night, till the dog is recovered; taking care to keep him in a warm place, and always fed with a warm liquid diet, such as broth, gruel, &c.

If the nostrils should discharge, have them washed, or syringed, twice a day, with a lotion of alum, or sugar of lead; putting about half an ounce of either to a pint of water.

Another.—For a half grown pointer.

Take of jalap powder, 25 grains, calomel, 5 grains. Made into a pill with a little gum water.

For a full grown pointer.

Take of jalap powder, 30 grains, calomel. 8 grains. Mixed as above.

One of these doses, mixed with butter, or in a small piece of meat, should be given to the dog every morning, on an empty stomach. The food should be light, and easy to digest; and the lotion, if required, for the nostrils, should be observed here, as before mentioned.

Distemper among cattle.

Examine your cow's mouth, though she appears very well; and if you find any pimple in it, or on the tongue, or if you perceive any within the skin ready to come out, immediately house her, keep her warm, and give her warm tar-water. To a large beast give a gallon, to a small one, three quarts. Give it four times every day; but not every time the quantity you first gave. Lessen the dose by degrees; but never give less than two quarts to a large beast, nor less than three pints to a small one; and house her every night for some time, and give her warm gruel and malt mash.

To make tar-water for cows.

Take one quart of tar, put to it four quarts of water, and stir it very well 10 or 12 minutes; let it stand a little while, and then pour it off for use. You must not put water to the same tar more than twice. Let the first dose be made of fresh tar. Continue to give it till the beast is well. Don't let her go too soon abroad.

For the garget in cows.

This disorder is very frequent in cows after ceasing to be milked; it affects the glands of the udder with hard swellings, and often arises from the animal not being clean milked. It may be removed by anointing the part three times a day with a little ointment composed of camphor and blue ointment. Half a drachm or more of calomel may be given in warm beer, from a horn or bottle, for 3 or 4 mornings, if the disorder is violent.

To cure the redwater in cattle.

Take 1 ounce of bole ammoniac, 1-2 an oz. of dragon's blood, 2 ounces of Castille soap, and 1 dr. of roche alum. Dissolve these in a quart of hot ale, or beer, and let it stand until it is blood warm; give this as one dose, and if it should have the desired effect, give the same quantity in about 12 hours after. This is an excellent medicine for changing the water, and acts as a purgative; every farmer that keeps any number of cattle, should always have some doses of it by him.

To cure the scouring in cattle.

The following composition has been found to succeed in many cases which were apparently drawing to a fatal termination.

Take of powdered rhubarb, 2 drachms, castor oil, 1 ounce, kali, prepared, 1 tea-spoonful.

Mix well together in a pint of warm milk. If the first dose does not answer, repeat it in 36 or 48 hours. If the calf will suck, it will be proper to allow him to do it.

Cure for cattle swelled with green food.

When any of your cattle happen to get swelled with an over feed of clover, frosty turnips, or such like, instead of the usual method of stabbing in the side, apply a dose of train-oil, which, after repeated trials, has been found to prove successful. The quantity of oil must vary according to the age or size of the animal. For a grown-up beast, of an ordinary size, the quantity recommended is about an English pint, which must be administered to the animal with a bottle, taking care, at the same time, to rub the stomach well, in order to make it go down. After receiving this medicine, it must be made to walk about until such time as the swelling begins to subside.—*Farmer's Magazine.*

Treatment of cattle and fowls.

The experiment has often been tried of the benefit derived to horses from being well combed and kept clean: it has been found that a horse neglected as to cleanliness, will not be so well conditioned, either for fatness or strength, though he gets abundance of corn; at least, it is certain that it would be worth trying. This every body knows, that the most neglected of the horse race are kept cleaner than the cleanest of the horned cattle, particularly those shut up in houses.

"I have two hints to give," says a contemporary writer, "as the expense can be nothing and the advantage may be great, I read in a Description of Norway, that when the cows drink at the hot-springs, they give more milk than those that drink cold water. Cows drink so much at a time, that there is no doubt, when the water is nearly at freezing, they must feel sensibly cooled all over, which will naturally affect their produce of milk. I would therefore propose the experiment of warming the water, for milch cows, in cold weather."

The next proposal is, that the corn given to fowls should be crushed, and soaked in water; this helps the digestion, and hens will lay in winter when so fed, that would not otherwise.

In a time of scarcity, and when the food of man is dear, such experiments as proposed are well worth making: and the practice proposed with the fowls ought to become general, as it costs nothing.—*Monthly Magazine.*

To cure the measles in swine.

It sometimes happens, though seldom, that swine have the measles; while they are in this state, their flesh is very unwholesome food. This disorder is not easily discovered while the animal is alive, and can only be known by its not thriving or fattening as the others. After the animal is killed and cut up, its fat is full of little kernels, about the size of the roe or eggs of a salmon. When this is the case, put into the food of each hog, once or twice a week, as much crude pounded antimony as will lie on a shilling. This is very proper for any feeding swine, even though they have no disorder. A small quantity of the flour of brimstone, also, may be given among their food when they are not thriving, which will be found of great service to them. But the best method of preventing disorders in swine, is to keep their sties perfectly clean and dry, and to allow them air, exercise, and plenty of clean straw.

Rupture in swine.

Where a number of swine are bred, it will frequently happen that some of the pigs will have what is called a 'rupture;' *i. e.* a hole broken in the rim of the belly, where part of the guts come out and lodges betwixt the rim of the belly and the skin, having an appearance similar to a swelling in the testicles. The male pigs are more liable to this disorder than the females. It is cured by the following means.

Geld the pig affected, and cause it to be held up with its head downwards; flay back the skin from the swollen place, and from the situation in which the pig is held, the guts will naturally return to their proper place. Sew up the whole with a needle, which must have a square point, and also a bend in it, as the disease often happens between the hinder legs, where a straight needle cannot be used. After this is done, replace the skin that was flayed back and sew it up, when the operation is finished. The pig should not have much food for a few days after the operation, until the wound begins to heal.

For the foot-rot in sheep.

Take a piece of alum, a piece of green vitriol, and some white mercury—the alum must be in the largest proportion; dissolve them in water, and after the hoof is pared, anoint it with a feather, and bind on a rag over all the foot.

Another.—Pound some green vitriol fine, and apply a little of it to the part of the foot affected, binding a rag over the foot as above. Let the sheep be kept in the house a few hours after this is done, and then turn them out to a dry pasture. This is the most common way of curing the foot-rot in Middlesex.

Another.—Others anoint the part with a feather dipt in aqua fortis, or weak nitrous acid, which dries it at once. Many drovers that take sheep to Smithfield, carry a little bottle of this about with them, which, by applying to the foot with a feather, helps a lame sheep by hardening its hoof, and enabling it to travel better. Some may think aqua fortis is of too hot a nature, but such a desperate disorder requires an active cure, which, no doubt, is ever to be used cautiously.

Another.—Spread some slacked quick lime over a house floor pretty thick, pare the sheep's feet well, and turn them into this house, where they may remain for a few hours, after which turn them into a dry pasture. This treatment may be repeated two or three times, always observing to keep the house clean, and adding a little more quick lime before putting them in.

The foot must be often dressed, and the sheep kept as much as possible upon dry land. Those animals that are diseased should be kept separate from the flock, as the disorder is very infectious.

Prevention and cure of the foot-rot in sheep.

On suspected grounds, constant and careful examination ought to take place; and when any fissures or cracks, attended with heat, make their appearance, apply oil of turpentine and common brandy. This, in general, produces a very beneficial effect, but where the disease has been long seated, and becomes, in a manner, confirmed—after cleaning the foot, and paring away the infected parts, recourse is had to caustics, of which, the best seem to be sulphuric acid, and the nitrate of mercury. After this, pledgets are applied, the foot bound up, and the animal kept in a clean, dry situation, until its recovery is effected.

But it often happens, where the malady is inveterate, that the disease refuses to yield to any, or all of the above prescriptions.

The following mode of treatment, however, if carefully attended to, may be depended upon as a certain cure. Whenever the disease makes its appearance, let the foot be carefully examined, and the diseased part well washed, and pared as nigh as possible, not to make it bleed; and let the floor of the house, where the sheep are confined, be strewn three or four inches thick with quick lime hot from the kiln; and the sheep, after having their feet dressed in the manner above described, to stand in it during the space of 6 or 7 hours.

In all cases, it is of great importance, that the animal be afterwards exposed only to a moderate temperature—be invigorated with proper food—and kept in clean, easy, dry pasture; and the disease will be effectually remedied in the course of a few days.—*Farmer's Magazine.*

To prevent sheep from catching cold after being shorn.

Sheep are sometimes exposed to cold winds and rains immediately after shearing, which exposure frequently hurts them. Those farmers who have access to the sea, should plunge them into the salt water, those who have not that opportunity, and whose flocks are not very large, may mix salt with water and rub them all over, which will in a great measure prevent any mishap befalling the animal, after having been stript of its coat.

It is very common in the months of June and July, for some kinds of sheep, especially the fine Leicester breed, which are commonly thin skinned about the head, to be struck with a kind of fly, and by scratching the place with their feet, they make it sore and raw. To prevent this, take tar, train oil, and salt, boil them together, and when cold, put a little of it on the part affected. This application keeps off the flies, and likewise heals the sore. The salt should be in very small quantity, or powdered sulphur may be used instead of it.

To cure the scab in sheep.

Take 1 pound of quicksilver, 1-2 a pound of Venice turpentine, 2 pounds of hog's lard, and 1-2 a pound of oil, or spirits of turpentine. A greater or less quantity than the above may be mixed up, in the same proportion, according to the number of sheep affected. Put the quicksilver and Venice turpentine into a mortar, or small pan, which beat together until not a particle of the quicksilver can be discerned: put in the oil, or spirits of turpentine, with the hog's lard, and work them well together until made into an ointment. The parts of the sheep affected must be rubbed with a piece of this salve, about the size of a nut, or rather less. When the whole flock is affected, the shepherd must be careful in noticing those that show any symptoms of the disorder, by looking back, and offering to bite or scratch the spot; and if affected, he must immediately apply the ointment, as it is only by paying early and particular attention that a flock can be cured.

To prevent the scab.

Separating the wool, lay the beforementioned ointment in a strip, from the neck down the back to the rump; another strip down each shoulder, and one down each hip; it may not be unnecessary to put one along each side. Put very little ointment on, as too much of it may be attended with danger.

To destroy maggots in sheep.

Mix with one quart of spring water, a table spoonful of the spirits of turpentine, and as much of the sublimate powder as will lie upon a shilling. Shake them well together, and cork it up in a bottle, with a quill through the cork, so that the liquid may come out of the bottle in small quantities at once. The bottle must always be well shaken when it is to be used. When the spot is observed where the maggots are, do not disturb them, but pour a little of the mixture upon the spot, as much as will wet the wool and the maggots. In a few minutes after the liquor is applied the maggots will all creep to the top of the wool, and in a short time drop off dead. The sheep must however, be inspected next day, and if any of the maggots remain undestroyed, shake them off, or touch them with a little more of the mixture.

A little train oil may be applied after the maggots are removed, as sometimes the skin will be hard by applying too much of the liquid. Besides, the fly is not so apt to strike when it finds the smell of the oil, which may prevent a second attack.

This method of destroying maggots is superior to any other, and it prevents the animal from being disfigured by clipping off the wool, which is a common practice in some countries.

Cure for the scab in sheep.

The simplest and most efficacious remedy for this disease, was communicated to the Society for the encouragement of Arts, &c. by the late Sir Joseph Banks; and is as follows:

Take 1 lb. of quicksilver, 1-2 a lb. of Venice turpentine, 1-2 a pint of oil of turpentine, 4 lbs. of hog's-lard.

Let them be rubbed in a mortar till the quicksilver is thoroughly incorporated with the other ingredients. For the proper mode of doing which, it may be right to take the advice or even the assistance of some apothecary, or other person used to make such mixtures.

The method of using the ointment is this: Beginning at the head of the sheep, and proceeding from between the ears, along the back, to the end of the tail; the wool is to be divided in a furrow, till the skin can be touched, and as the furrow is made, the finger, slightly dipped in the ointment, is to be drawn along the bottom of it, where it will leave a blue stain on the skin and adjoining wool.

From this furrow, similar ones must be drawn down the shoulders and thighs to the legs, as far as they are woolly; and if the animal is much infected, two more should be drawn along each side, parallel to that on the back, and one down each side, between the fore and hind legs.

Immediately after being dressed, it is usual to turn the sheep among other stock, without any fear of the infection being communicated; and there is scarcely an instance of a sheep suffering any injury from the application. In a few days the blotches dry up, the itching ceases, and the animal is completely cured. It is generally, however, thought proper not to delay the operation beyond Michaelmas.

The hippobosca ovina, called in Lincolnshire, Sheep-fagg, an animal well known to all shepherds, which lives among the wool, and is hurtful to the thriving of sheep, both by the pain its bite occasions, and the blood it sucks, is destroyed by this application, and the wool is not at all injured. Our wool-buyers purchase the fleeces on which the stain of the ointment is visible, rather in preference to others, from an opinion, that the use of it having preserved the animal from being vexed, either with the scab or faggs, the wool is less liable to the defects of joints or knots; a fault observed to proceed from every sudden stop in the thriving of the animal, either from want of food, or from disease.

To cure the water in the heads of sheep.

Of all the various operations by which this distemper may be eradicated, I must, from experience, give the preference to one which will, perhaps, astonish such of your readers as form their opinions more from theory than practice. A number of medical men have already controverted the fact; and, with the utmost presumption, disputed my veracity to my face, after I had witnessed its efficacy in a thousand instances. It is no other than that of putting a sharpened wire up the nostril quite through the middle of the brain, and by that means perforating the bag which contains the fluid causing the disease. This is, of all other methods, the most certain to succeed: but it has this unpleasant appendage annexed to it, if it do not cure, it is certain to kill.

This method of cure is not only the most expedient, but it is in every shepherd's power, and one which he can scarcely perform amiss, if he attend to the following plain directions.

The operation must be performed with a stiff steel wire, such as is used for knitting the coarsest stockings. It must be kept clean, and free of rust, oiled, and sharpened at the point. Care must be taken, however, that its point be only one-eighth of an inch in length, for if it is tapered like a needle, it is apt to take a wrong direction in going up the nostrils, fix in the gristle below the brain, and torment the animal to no purpose. If blunt in the point, it often fails to penetrate the bladder, which is of considerable toughness, shoving it only a little to one side; the safest way of course, is to have the point of the wire sharp and short.

The shepherd must first feel with his thumbs for the soft part in the skull, which invariably marks the seat of his disease. If that is near the middle of the head above, where, in two cases out of three at least, it is sure to be, let him then fix the animal firm betwixt his knees, hold the head with one hand, laying his thumb upon the soft or diseased part, and with the other hand insert the wire by the nostril, most on a parallel with the seat of the distemper, aiming directly at the point where his thumb is placed. The operation is performed in one second, for if he feels the point of the wire come in contact with his thumb let him instantly set the animal to its feet; and if the weather is at all cold, let it stand in the house over-night.

If the disease is seated exactly in that part where the divisions of the skull meet, and consequently in a right line with the top of the nose, he must probe both nostrils; when, should he miss the bulb on the one side, he will be sure to hit it on the other. If the seat of the disease cannot at all be found, and if the animal have all the symptoms of the malady, the water is then inclosed among the ventricles in the middle of the brain, and must be treated as above. Nothing can be done in the last case, save with the wire; but it is hard to cure them when so affected. I have found, on dissection, the fluid contained in many little cells in the centre of the brain; and though the wire had penetrated some of those cells, it had missed others.

By this simple operation alone, I have cured hundreds; and though I never kept an exact register. I think I have not known it to fail above once in four times at an average, in all the instances which have come under my observation; and some of these I knew to be injudiciously performed, the disease not being seated in a point which the wire could reach. I have at times cured a dozen, and ten, in regular succession, without failing once, and I have again, in some cold seasons of the year, killed three or four successively.

Sir George M'Kenzie has insinuated in his book on sheep, that I was the inventor of this mode of cure—but it is by no means the case. The practice, I understand, has been in use, among shepherds for ages past; but they were often obliged to perform it privately, their masters, like the professors about Edinburgh, always arguing, that the piercing of the brain must necessarily prove fatal. Sir George has, however, misunderstood my account in this matter in the Highland Society's Transactions; I did not mean to insinuate that it was with pleasure I discovered the art of curing them in this way, but only my success in that art. I mentioned in these Transactions, that when I was a shepherd boy, for a number of years I probed the skull of every sturdied sheep I could lay my hands on, without any regard to whom they belonged, and likewise took every opportunity of visting my patients as often as possible; and as the country around me swarmed with them every spring and summer, my practice, of course, was of prodigious extent. It was several years before I was sensible of failing in one instance, which, however, it was often impossible to ascertain, they having left the spot sometimes, before I could again go that way: but many a valuable young sheep I cured to different owners, without ever acknowledging it, having no authority to try such experiments.

The following symptoms, after the operation, may be depended on. If the animal becomes considerably sick, it is a good sign that it will recover. If it continues to grow sicker, and abstains from feeding for the space of two days, it is likely to die; and, if in a condition to be fit for family use, ought to be killed forthwith. The flesh of the animal is nothing the worse for this disease; on the contrary, it is universally supposed by the country people, that their flesh is sweeter, more delicate and palatable, than any other. This, I suppose, must be owing to their tender age, it being unusual to kill any sheep so young, save lambs.

The first symptom of recovery is their bleating. If once they begin to bleat occasionally, they are sure to recover, however stupid they may appear at that time. It seems that they are then becoming sensible of the want of society, the only thing which causes sheep to bleat, and which, for a long time previous to that, they had totally disregarded.

I must mention here, that the most successful curer of this distemper I ever knew, performed the operation in a different manner from the one practised by me, and above recommended. Instead of a wire, he carried always a large corking pin in his bonnet, and, like me, tapped every sturdied sheep he found, but always above, putting the point of the pin through the skull at the place where it was most soft, in the same manner as the trocar is used. As this does not at all endanger the sheep's life, I frequently tried this plan previous to that of probing with the wire; but, as far as I can recollect, I never cured one by that means. I remember of once conversing with him on the subject, when he told me that he seldom or never failed of curing them upon their own farms; but that, in sundry neighbouring farms, he rarely cured any. From this, it would appear that, on different soils, the animals are differently affected. I am now convinced that he must generally have inserted the pin so far as to penetrate the bottom of the sac, which I never had the sense to try, and which, if we reason from analogy, must prove as effective, and less hazardous than the other: for, it appears to me, that, in order to ensure a recovery, it is necessary that the bottom, or lowest part of the sac, be penetrated.

Undoubtedly, the best mode of curing this disease would be, to extract the sac, and all that it contains, entirely. There is little doubt that, if this were performed by gentle and skilful hands, it would prove the most effectual cure; but as it is, I can attest that it seldom proves successful. The shepherds have not skill and ingenuity sufficient to close the skull properly up again, or sort it in such a manner as it is requisite to defend it from external injury; of course, I would rather recommend the mode in which they cannot easily go wrong, and which I have seen prove most beneficial, when performed by men of like acquirements with themselves.—*Farmer's Magazine.*

To prevent the "sturdy," or water in the heads of sheep.

With regard to the causes inducing water in the head in sheep, there is but one opinion entertained among shepherds, which is, that it is occasioned by a chilliness in the back of the animal, on account of its being exposed to the winds, and the sleety showers of winter. The cause is to acquire a kind of numbness and torpidity, which, if often repeated, are apt to terminate in an affection to giddiness, and finally in a water in the head.

That this disease is occasioned solely by a chilliness in the back, appears from the following facts.

1. It is always most general after a windy and sleety winter.

2. It is always most destructive on farms that are ill-sheltered, and on which the sheep are most exposed to those blasts and showers.

3. It preys only on sheep rising their first year, the wool of whom separates above, leaving the back quite exposed to the wet and to the cold.

4. If a piece of cloth or hide is sewed to the wool, so as to cover the back, such a sheep will not be affected with the disease. The experiment is a safe, a cheap, and an easy one; and, exclusive of its good effects in preventing the fatal disease under consideration, it is the most beneficial to a young sheep that is not over high in condition, and administers the most to its comfort during the winter, of any other that I know. It keeps the wool from opening, and the sheep always dry and warm in the back, which, exposed to cold, either in man or beast, it is well known, affects the vitals materially. When thus shielded, the young sheep will feed straight in the wind, on the worst days, without injury, and, indeed, without much regarding the weather. This covering keeps them from the rain, prevents them from being shelled and loaded with frozen snow, and from destruction by cold, by leanness, and the water in the head. The expense attending it is so trifling, that it is scarcely worth mentioning. One pair of old blankets, of the value of four or five shillings, will furnish coats for forty sheep: and if these are carefully taken off on the return of spring, and laid aside, they will serve the purpose for two or three successive years.—*Farmer's Magazine.*

Practice of the Spanish shepherds.

The first care of the shepherd on coming to the spot where his sheep are to spend the summer, is to give to his ewes as much salt as they will eat. For this purpose he is provided with twenty-five quintals of salt for every thousand head, which is consumed in less than 5 months; but they eat none on their journey, or in winter. The method of giving it to them is as follows:—The shepherd places fifty or sixty flat stones about five steps distance from each other; he strews salt upon each stone, then leads his flock slowly through the stones, and every sheep eats at pleasure. This is frequently repeated, observing not to let them eat on those days in any spot where there is limestone. When they have eaten the salt, they are led to some argillaceous spots, where, from the craving they have acquired they devour every thing they meet with, and return again to the salt with redoubled ardour.

Cure of dropsy in the crops of young turkeys.

This kind of dropsy is announced by a dull look, paleness of the head, loss of appetite, and aversion to food. The birds allow themselves to be approached and seized with facility, and they are without strength. Very soon a slight swelling of the crop is added to these symptoms, which, in ten days, becomes very considerable. I have taken nearly a pint of water from one. By pressing upon the crops of some of them, a certain quantity of matter is discharged by the bill, but never enough entirely to ease the crop. All these symptoms increase, and the bird dies at the end of 15 or 18 days' illness.

I sought after the cause of this disorder, and it was easy to find that it was occasioned by the stagnant water of which these animals had drunk; in the course of the year the heat had been great, and there was little rain. The heat had hatched a vast swarm of small red worms, resembling ascarides. It is quite certain that these insects must have been swallowed by the turkeys, and from this cause, and the bad quality of the water which they had drunk, a great degree of inflammation in the crop would ensue, with a stoppage of the passage which conducts to the gizzard. I divided the turkeys into two classes; for those who were still sound I ordered grain and good water; with all that were diseased I practised the operation of tapping with a lancet, in the lowest part of the crop. I injected at the opening, by means of a small syringe, a slight decoction of Jesuits' bark, mixed with a little brandy, which was repeated twice in the course of the day. Next day the wound was better marked. I made again the same injection, and, two hours after, I forced them to eat a little of the yolk of an egg, mixed with some crumbs of bread. At the end of 3 days, the wound in the crop was closed, which I might have prevented, but finding a natural opening in the bill, I made them take, during eight days, in their drink, the same substances which had been injected; and they were, by degrees, put upon their usual diet. I need not add, that clear water was given them instead of that of the standing pools. Ten of these animals had died before my arrival; two perished during the treatment, and the rest of the flock, which might be about forty, either escaped the disease or were cured.—*M. Ligneau.*

To cure colds of every description in cattle.

The first attempt should be to remove the cause, by giving to the animal a warm cordial drink; which, acting as a stimulant on the stomach and intestines, will give fresh motion to these parts, and enable nature to resume her former course.

Take of aniseeds, caraway-seeds, grains of paradise, and fenugreek, each 2 oz. in powder. Mix them together for one drink.

Another.—Take of sweet fennel-seeds, and cummin-seeds, each 2 oz. in powder, long pepper, turmeric, ginger, and Enula Campana (elecampane), each 1 ounce, in powder. Mix for one drink.

The method of giving either of these drinks is as follows:—Take one and put it into a pitcher with 2 oz. of fresh butter, and 2 table-spoonsful of treacle or coarse sugar; then pour one quart of boiling ale upon the whole; cover them down till new milk warm, and then give the drink to the beast.

In two hours after giving the drink, let the animal have a good mash made of scalded bran, or ground malt, with a handful or two of ground oats or barley meal added to it, and warm water that day. In slight colds during the summer, these drinks may be given to cattle while in their pasture; and, where it can be made convenient, let them fast 2 hours after, and then graze as usual. It is also necessary to examine the sick animals every day, to watch them while they both dung and stale, and to see whether the body be of a proper heat, and the nose or muzzle of a natural breeze.

If these be regular, there is not much danger. If, however, feverish symptoms should appear (which frequently happen), the animal will become costive. In such cases give one of the following:

Purging drink.

Take of Glauber salts, 1 lb. ginger, in powder, 2 oz. treacle, 4 oz.

Put all the ingredients into a pitcher, and pour 3 pints of boiling water upon them. When new-milk warm, give the whole for one dose.

Another.—Take of Epsom salts, 1 lb. aniseeds and ginger, in powder, each 2 oz. treacle, 4 oz.

Let this be given in the same manner as the preceding.

In most cases these drinks will be sufficient to purge a full-grown animal of this kind. By strict attention to the above method of application, a fever may be prevented, and the animal speedily restored.

If the fever continue, after the intestines have been evacuated (which is seldom the case), it will be proper to take some blood from the animal, and the quantity must be regulated according to the disease and habit of body.

To cure the yellows or jaundice in neat cattle.

As soon as this disease makes its first appearance, it may, for the most part, be removed by administering the following drink:

Reduce to powder cummin seeds, aniseeds, and turmeric root, each 2 oz. grains of paradise, and salt of tartar, each, 1 oz.

Now slice 1 oz. of Castille soap, and mix it with 2 oz. of treacle; put the whole into a pitcher, then pour a quart of boiling ale upon the ingredients, and cover them down till new milk warm, then give the drink.—It will often be proper to repeat this, two or three times, every other day, or oftener if required. If the beast be in good condition, take away from two to three quarts of blood; but the animal should not be turned out after bleeding that day, nor at night, but the morning following it may go to its pasture as usual. After this has had the desired effect, let the following be given.

Take of balsam of copaiva, 1 oz. salt of tartar, 1 oz. Castille soap, 2 oz. Beat them together in a marble mortar; and add of valerian root, in powder, 2 oz. ginger root and Peruvian bark, in powder, each 1 oz. treacle, 2 ounces.

Mix for one drink.

Let this drink be given in a quart of warm gruel, and repeated if necessary every other day. It will be proper to keep the body sufficiently open through every stage of the disease; for if costiveness be permitted, the fever will increase, and if not timely removed, the disorder will terminate fatally.

Frenzy, or inflammation of the brain,

Is sometimes occasioned by wounds or contusions in the head, that are attended with violent inflammations of the vessels, and if not speedily relieved may terminate in a gangrene or a mortification, which is very often the case, and that in a few days.

Method of cure.

In the cure of this disease, the following method must be attended to:—First lessen the quantity of blood by frequent bleeding; which may be repeated daily if required; and by which the great efflux of blood upon the temporal arteries will be lessened and much retarded. The following purgative drink will be found suitable for this disease, and likewise for most fevers of an inflammatory nature.

Take of Glauber salts, 1 lb. tartarized antimony, 1 drachm, camphor, 2 dr. treacle, 4 oz.

Mix and put the whole into a pitcher, and pour 3 pints of boiling water upon them.

When new milk warm add laudanum, half an ounce, and give it all for one dose.

This drink will in general operate briskly in the space of 20 or 24 hours; if not, let one half of the quantity be given to the beast every night and morning, until the desired effect be obtained.

To cure hoven or blown in cattle.

This complaint is in general occasioned by the animal feeding for a considerable time upon rich succulent food, so that the stomach becomes overcharged, and they, through their greediness to eat, forget to lie down to ruminate or chew their cud. Thus the paunch or first stomach is rendered incapable of expelling its contents; a concoction and fermentation take place in the stomach, by which a large quantity of confined air is formed in the part that extends nearly to the anus, and for want of vent at that part, causes the animal to swell even to a state of suffocation, or a rupture of some part of the stomach or intestines ensues. As sudden death is the consequence of this, the greatest caution is necessary in turning cattle into a fresh pasture, if the bite of grass be considerable; nor should they be suffered to stop too long at a time in such pastures before they are removed into a fold yard, or some close where there is but little to eat, in order that the organs of rumination and digestion may have time to discharge their functions.

If this be attended to several times, it will take away that greediness of disposition, and prevent this distressing complaint.

Treatment.

As soon as the beast is discovered to be either hoven or blown, by eating too great a quantity of succulent grasses, let a purging drink be given; this will for the most part check fermentation in the stomach, and in a very short time force a passage through the intestines.

Paunching.

This is a method frequently resorted to in dangerous cases. The operation is performed in the following manner:—Take a sharp penknife and gently introduce it into the paunch between the haunch bone and the last rib on the left side. This will instantly give vent to a large quantity of fetid air; a small tube of a sufficient length may then be introduced into the wound, and remain until the air is sufficiently evacuated; afterwards, take out the tube, and lay a pitch plaister over the orifice. Wounds of this kind are seldom attended with danger; where it has arisen, it has been occasioned by the injudicious operator introducing his knife into a wrong part. After the wind is expelled, and the body has been reduced to its natural state, give the following:

Cordial drink.

Take aniseeds, diapente, and elecampane, in powder, each 2 ounces, tincture of rhubarb, 2 ounces, sweet spirits of nitre, 1 ounce, treacle, 4 tablespoonsful.

Mix and give it in a quart of warm ale or gruel.

This drink may be repeated every other day for 2 or 3 times.

Another.—Take aniseeds, grains of paradise, and cummin-seeds, each 2 ounces, in powder, spirits of turpentine, 2 table-spoonsful, sweet spirits of nitre, 1 oz. treacle, 2 table-spoonsful.

Mix and give them in a quart of warm ale or gruel.

This may be repeated once a day for 2 or 3 times.

To cure swimming in the head.

This disease mostly attacks animals that have been kept in a state of poverty and starvation during the winter season; and which have in the spring of the year been admitted into a fertile pasture: hence is produced a redundancy of blood and other fluids, pressing upon the contracted vessels, while the animal economy, on the other hand, is using its utmost endeavour to restore reduced nature to its original state. If it is not checked in its infancy by bleeding, evacuating, &c. inflammation in all probability must take place; in which case the beast is attended with all the symptoms of one that is raving mad.

The cure must first be attempted by taking from two to three or four quarts of blood from the animal, according to size and strength; 2 or 3 hours after give a purging drink.

Purging is very necessary in this disease, as well as in all others of an inflammatory kind; for otherwise it will be impossible to check its progress: and as soon as this is effected the following may be given:

Sudorific drink for the same.

Take of tartar emetic, 1 drachm, volatile salt, and camphor, each 2 drachms, in powder, nitre, and cream of tartar, in power, each 1 oz. treacle, 4 table-spoonsful.

Mix and put them in a pitcher, with a quart of hot gruel, then stir the whole together and give it when new milk warm.

It will be necessary to repeat this drink twice a day, until the symptoms begin to abate: afterwards once a day will be sufficient. But so long as the fever continues to be attended with delirious symptoms, it will be proper to take from one to two or three quarts of blood from the animal every two or three days.

TANNING,

AND THE TREATMENT OF LEATHER.

To tan hides or skins.

There are many vegetable substances which possess the tanning principle: but the chief are the oak, the alder, *valonea*, *larch*, willow, and Peruvian barks. The latter from its high value is only used in medicine; oak bark, from its plentiful supply, and the strength of its astringent juices, may be properly termed the staple article of the tanning business; this bark is ground into coarse shreds in a mill from which a decoction or liquor is made, called ooze, into which the hides or skins, after being properly cleared of their extraneous filth and juicy redundancies, are immersed, and first subjected to the action of a weak decoction of tan, in which stage they remain according to their strength and size, from a fortnight to several weeks, during which they are frequently handled, to create a more kindly incorporation between the vegetable and animal juices, from thence they are removed to a vat containing a stronger infusion of bark, where they remain a considerable time, until they have absorbed all the tan; they are then immersed in a still stronger infusion of this liquor, and frequently taken out to be handled as before: if it is perceived that the liquor does not operate upon them with sufficient effect, a plentiful sprinkle of dry bark is thrown betwixt every layer of hides, and as soon as the outside and internal parts assume a good healthy brown colour, they may be said to be converted into leather. Calf skins require, according to their size, from 2 to 3 months in tanning: cow hides 6 months, and strong ox hides from 9 to 12 months.

The article of valonea, a most powerful vegetable astringent, has become a great favourite with tanners of late years; it is allowed to give the leather more weight than oak bark, but it produces a dulness of colour in the article tanned with it: at the same time it is the finest basis for blacks the dyers possess. The bark of the larch fir gives to leather a most beautiful bloom, and since it has been proved equal to the tannage of heavy hides, is likely to become the best substitute for oak bark.

To tan without bark or mineral astringents.

This method does not differ from that in general use, except in the saving of time and expense, and the preparation of the astringent liquor. The hides and skins, previous to their being put into the liquor, are plunged into a preparation of bran and water for two days. The astringent liquor is composed of 17 gallons of water, 1-2 lb. of Aleppo galls, 5 lbs. of tormentil, or septfoil root, and 1 1-2 oz. of Bengal catechu. The galls, &c. are to be finely powdered, and boiled in the water a certain time, and when cool, the skins are to be put in, and handled frequently during the first three days, afterwards to remain two or three days; then to be handled two, three, or more times in one day, and finally to remain undisturbed for 25 days, when the process is completed.

This improved method of tanning will produce a saving of 50 per cent. in money, and at least two months in time.

Improvement in tanning.

The trunk, roots, limbs, branches, and leaves of the oak, whether tree, pollard, coppice, or under-wood, possess tanning properties in a sufficient quantity to be employed with advantage for tanning, by reducing them to chips or saw-dust, and then boiling and using them in the following way:

To tan calf or other skins.

Put 1 cwt. of the limbs or branches, chopped as above, into a copper containing about 60 gallons of water, and boil till the water be reduced to from 35 to 40 gallons: draw off the decoction.

Now add to the same limbs or branches, 40 gallons of water, and again boil till the water be reduced to about 25 gallons. The liquor thus produced by the second boiling is used as a weak ooze, in the first process of immersing the calf-skins after they come from the scouring beam. The decoction first produced, is then to be used in the same way.

To tan hides.

Take 1 cwt. of the limbs or branches, 3-4 cwt. of oak saw-dust, (the sooner after being made the better,) and 1-4 cwt. of the root; boil in 80 gallons of water, till reduced to from 50 to 60 gallons. Draw off the decoction, and put it aside for use. To the materials left in the copper add 60 gallons of water, and again boil, till reduced to from 30 to 35 gallons. The liquor produced by this second boiling is to be employed in the first stage of tanning hides after they come from the beam; and afterwards the decoction first produced is to be employed. The skins and hides having undergone the before-mentioned processes, add as much oak bark, or tan-liquor, or both, to the respective decoctions, as is necessary to complete the tanning. The quantity of each will vary according to the strength of such decoctions; which strength will depend on the age and size of the tree, and other circumstances.

Another.—As soon as the wool or hair is pulled or taken off, let the hide or skin be dipped into water und undergo the operation of fleshing. It should then be dipped again into water, and undergo the operation called skudding; after which it will be in a state fit to be tanned, tawed, or dressed.

This process occupies much less time, and occasions less labour and expense, than that in general practice, which consists in immersing the skins in lime-pits, for several weeks, to be afterwards drenched and pu-purified.

New process of tanning.

Oak saw-dust and slips of oak, cut thin, and even the leaves of that tree, contain a sufficient quantity of the tanning principle, to recommend it as advantageous in the manufacturing of leather. To tan calf and sheep skins, or other light articles, take 100 lbs. of thin oak slips, boil them in 60 gallons of water reduced to 40, leave it to depose, and then decant it; afterwards pour 40 gallons of fresh water on the residue and boil it till reduced to 25 gallons, immerse the skins into the last decoction, after receiving the accustomed preparations, then put them into the liquor first prepared, and let them remain till fully saturated with the searching powers of the vegetable liquid.

To convert sheep skins into leather.

Sheep skins, which are used for a variety of purposes, such as gloves, book covers, &c. and which, when dyed, are converted into mock Morocco leather, are dressed as follows:—They are first to be soaked in water and handled, to separate all impurities, which may be scraped off by a blunt knife on a beam. They are then to be hung up in a close warm room to putrefy. This putrefaction loosens the wool, and causes the exudation of an oily and slimy matter, all which are to be removed by the knife. The skins are now to be steeped in milk of lime, to harden and thicken; here they remain for a month or 6 weeks, according to circumstances, and when taken out, they are to be smothed on the fleshy side by a sharp knife. They are now to be steeped in a bath of bran and water, where they undergo a partial fermentation, and become thinner in their substance.

The skins, which are now called pelts, are to be immersed in a solution of alum and common salt in water; in the proportion of 120 skins to 3 lbs. of alum and 5 lbs. of salt. They are to be much agitated in this compound saline bath, in order to become firm and tough. From this bath they are to be removed to another, composed of bran and water, where they remain until quite pliant by a slight fermentation. To give their upper surfaces a gloss, they are to be trodden in a wooden tub, with a solution of yolks of eggs in water, previously well beaten up. When this solution has become transparent, it is a proof that the skins have absorbed the glazing matter. The pelt may now be said to be converted into leather, which is to be drained from moisture, hung upon hooks in a warm apartment to dry, and smoothed over with warm hand-irons.

To prepare sheep leather for various elegant purposes, by dyeing.

The skins, when taken from the lime-bath, are immersed in one composed of dog and pigeon dung, dissolved by agitation in water: here they remain until the lime is separated, and until the skins have attained the state of soft pliable pelt. To dye this pelt red, the skins are to be washed and sewed into bags, and stuffed with clippings and shavings of leather, or any other convenient substance, and immersed, with the grain side outwards, in a bath of alum and cochineal, of the temperature of 170 or 180 degrees Fahr. where they are to be agitated until they are sufficiently dyed. Each bag is now to be transferred to a sumach bath, where they receive consistency and tenacity. From this bath it is customary to remove the skins, and to plunge them into a saffron one, to improve their colour.

To dye these skins black, the washed pelt is to be first immersed in the sumach bath, and then to be rubbed over on the grained side, by a stiff brush dipped in a solution of acetate, or pyrolignite of iron.

To give these skins the grain and polish of Morocco leather, they are first oiled, and then rubbed on a firm board, by a convex piece of solid glass to which a handle is attached. The leather being now rendered more compact, is rubbed or pressed hard, by a sharply grooved boxwood instrument, shaped like the glass one just described.

Lamb and kid skins are dressed, tanned, and dyed in a similar manner.

To manufacture real Morocco leather.

Goat skins are cleansed by soaking them in water, have their hair removed, and are limed as in the before-mentioned processes. They then undergo a partial fermentation, by a bath of bran and water, and are afterwards immersed in another bath of white figs and water, where they remain for five or six days. It is now necessary to dip them in a solution of salt and water, to fit them for dyeing. To communicate a red colour, the alum and cochineal bath is to be used as for sheep skins; for black, sumach, and iron liquor as before; and for yellow, the bath is to be composed of alum and the pomegranate bark.

The tanning, dressing, and graining are the same as for sheep skins.

Original method.

The skins being first dried in the air, are steeped in water three days and nights; then stretched on a tanner's horse, beaten with a large knife, and steeped afresh in water every day: they are then thrown into a large vat on the ground, full of water, where quicklime has been slaked, and there lie 15 days; whence they are taken, and again returned every night and morning. They are next thrown into a fresh vat of lime and water, and shifted night and morning for 15 days longer; then rinsed in clean water, and the hair taken off on the leg with the knife, returned into a third vat, and shifted as before for 18 days; steeped twelve hours in a river, taken out, rinsed, put in pails, where they are pounded with wooden pestles, changing the water twice; then laid on the horse, and the flesh taken off; returned into pails of new water, taken out, and the hair-side scraped; returned into fresh pails, taken out, and thrown into a pail of a particular form, having holes at bottom: here they are beaten for the space of an hour, and fresh water poured on from time to time; then being stretched on the leg, and scraped on either side, they are returned into pails of fresh water, taken out, stretched, and sewed up all round, in the manner of bags, leaving out the hinder legs, as an aperture for the conveyance of a mixture described below.

The skins thus sewed are put in lukewarm water, where dog's excrements have been dissolved. Here they are stirred with long poles for half an hour, left at rest for twelve hours, taken out, rinsed in fresh water, and filled by a tunnel with a preparation of water and sumach, mixed and heated over the fire till ready to boil; and, as they are filled, the hind legs are sewed up to stop the passage. In this state they are let down into the vessel of water and sumach, and kept stirring for four hours successively; taken out and heaped on one another: after a little time their sides are changed, and thus they continue an hour and a half till drained. This done, they are loosened, and filled a second time with the same preparation, sewed up again, and kept stirring two hours, piled up and drained as before. This process is again repeated with this difference, that they are then only stirred a quarter of an hour; after which they are left till next morning, when they are taken out, drained on a rack, unsewed, the sumach taken out, folded in two from head to tail, the hair-side outwards, laid over each other on the leg, to perfect their draining, stretched out and dried: then trampled under foot by two and two, stretched on a wooden table, what flesh and sumach remains scraped off, the hair-side rubbed over with oil, and that again with water.

They are then wrung with the hands,

stretched, and pressed tight on the table with an iron instrument like that of a currier, the flesh-side uppermost; then turned, and the hair-side rubbed strongly over with a handful of rushes, to squeeze out as much of the oil remaining as possible. The first coat of black is now laid on the hair-side, by means of a lock of hair twisted and steeped in a kind of black dye, prepared of sour beer, wherein pieces of old rusty iron have been thrown. When half-dried in the air, they are stretched on a table, rubbed over every way with a paumelle, or wooden-toothed instrument, to raise the grain, over which is passed a light couche of water, then sleeked by rubbing them with rushes prepared for the purpose. Thus sleeked, they have a second couche of black, then dried, laid on the table, rubbed over with a paumelle of cork, to raise the grain again; and after a light couche of water, sleeked over anew; and to raise the grain a third time, a paumelle of wood is used.

After the hair-side has received all its preparations, the flesh side is pared with a sharp knife for the purpose; the hair-side is strongly rubbed over with a woollen cap, having before given it a gloss with barberries, citron, or orange. The whole is finished by raising the grain lightly, for the last time, with the paumelle of cork; so that they are now fit for the market.

To prepare red Morocco.

After steeping, stretching, scraping, beating, and rinsing the skins, as before, they are at length wrung, stretched on the leg, and passed after each other into water where alum has been dissolved. Thus alumed, they are left to drain till morning, then wrung out, pulled on the leg, and folded from head to tail, the flesh inwards.

In this state they receive their first dye, by passing them after one another into a red liquor, described hereafter. This is repeated again and again, till the skins have got their first colour; then they are rinsed in clean water, stretched on the leg, and left to drain 12 hours; thrown into water through a sieve, and stirred incessantly for a day with long poles; taken out, hung on a bar across the water all night, white against red, and red against white, and in the morning the water stirred up, and the skins returned into it for 24 hours.

Ingredients for the red colour.

The following is the quantity and proportions of the ingredients required for the red colour, for a parcel of thirty-six skins:—

Cochineal, 130 drachms, round suchet, (crocus indicus,) 45 do. gutta gamba, 15 do. gum arabic, 10 do. white alum pulverized, 10 do. bark of the pomegranate tree, 10 do. citron juice, 2 do. common water, 120 lbs.

The alum is gradually added to the other articles, and boiled in a copper for about two hours, till one-tenth part of the water be consumed.

To manufacture leather in imitation of Morocco, from South American horse hides.

Soften the hides in water, then spread it on a tanner's beam, and let it be wrought with a knife on the flesh side, and subjected to the action of lime water. In the succeeding process it is treated as goat-skins for making moroccos, *i. e.* put it into hot water, with dog's dung, to purify the animal juices; then let it be again wrought with a knife on both sides, on a tanner's beam; afterwards put it into blood warm water, with bran; and, finally, tan it with sumach.

To manufacture Russia leather.

Calf-skins steeped in a weak bath of carbonate of potass and water, are well cleaned and scraped, to have the hair, &c. removed. They are now immersed in another bath, containing dog and pigeon's dung in water. Being thus freed from the alkali, they are thrown into a mixture of oatmeal and water, to undergo a slight fermentation. To tan these hides, it is necessary to use birch bark instead of oak bark; and during the operation they are to be frequently handled or agitated. When tanned, and perfectly dry, they are made pliable by oil and much friction; they are then to be rubbed over gently with birch tar, which gives them that agreeable odour peculiar to this kind of leather, and which secures them against the attacks of moths and worms. This odour will preserve the leather for many years; and on account of it, Russia leather is much used in binding handsome and costly books. The marks, or intersecting lines on this leather, are given to it, by passing over its grained surface a heavy iron cylinder, bound round by wires.

Use of the wood and bark of the horse-chesnut tree.

The bark of the horse-chesnut tree contains twice the quantity of tanning principle as that of the oak, and nearly twice as much colouring matter as the best Campeachy logwood: its colouring matter is to that of Campeachy exactly as 1^{857} is to 1.

The leather manufactured from it is firmer, more solid and flexible, than that from the oak. Besides, what renders it particularly valuable is, it contains a most powerful basis for black dyes and ink. Mixed with iron of copperas, it changes to a blueish black. Its liquor, extracted, by boiling, appears blue like indigo, but produces on paper a most excellent black. In dyeing it possesses more affinity with wool than sumach; and its extracted colour contains that rare virtue in a dye—permanency of colour.

To tan or dress skins in white for gloves.

Clean the skins from wool or hair, by laying them in a vat of slacked lime water for 5 or 6 weeks. During this operation the lime and water are to be twice changed, and the skins are to be shifted every day, and when taken out for good, they are to be laid all night in a running water, to clear them from the forcing qualities of the lime: next lay them on a wooden leg by sixes, to get the flesh off: then they are to be laid in a vat with a little water, and to be fulled with wooden pestles for a quarter of an hour, after which rinse them well in a full vat of water; place them next on a clean pavement to drain, and afterwards cast them into a fresh pit of water, rinse them again, and relay them on the wooden leg, with their hair outside, over which a whetstone is to be briskly rubbed, to fit them for further preparations. They are next to be put into a pit of water mixed with wheaten bran, and stirred until the bran sticks to the wooden poles. They now arrive to a kind of fermentation, and as often as they rise on the top of the water, are to be plunged down; at the same time the liquor, now highly fermented, is to be fined. When the skins have done rising, take them out, and scrape away the bran with a knife on the leg: when sufficiently drained give them their feeding. For 100 large sheep skins, take 8 lbs. of alum, and 3 lbs. of sea-salt, and melt the whole with water in a vessel. Pour the solution out while lukewarm, into a trough in which is 20 lbs. of the finest wheat flour, with the yolk of 8 dozen of eggs, of which mixed materials is formed a kind of paste, somewhat thicker than children's pap: next pour hot water into the trough where the paste was, mixing two spoonsful of the paste with it, with a wooden spoon, which will contain a sufficiency for 12 skins, and when the whole is well incorporated, put 2 dozen of the skins into it, taking care that the water is not too hot. After they have been in some time, take them severally out of the trough, and stretch them twice well out. After they have absorbed the paste, put them into tubs, and full as before. Let them lie in a vat 6 days, and hang them out to dry, in fair weather, on cords or racks. When dry, put them into bundles, just dipped in clean water, and drained; throw them into an empty tub, and having lain some time they are to be taken out and trampled under foot; hang them up a second time on the cords to dry, and finally smooth them upon a table ready for sale.

To prepare sheep, goat, or kid-skins in oil, in imitation of chamois.

Sheep skins.

The skins, smeared with quick lime on the fleshy side, are folded lengthways, the wool outwards, and laid on heaps, to ferment 8 days; or if they had been left to dry after flaying, for fifteen days.

Then they are washed out, drained, and half dried, laid on a wooden horse, the wool stripped off with a round staff, for the purpose, and laid in a weak pit of slaked lime.

After twenty-four hours they are taken out, and left to drain 24 more; then put into another strong pit. Then they are taken out, drained, and put in again by turns; which begins to dispose them to take oil; and this practice they continue for six weeks in summer, or 3 months in winter; at the end whereof they are washed out, laid on the wooden horse, and the surface of the skin on the wool side peeled off, to render them the softer; then made into parcels, steeped a night in the river, in winter more; stretched 6 or 7, one over another on the wooden horse; and the knife passed strongly on the fleshy side, to take off any thing superfluous, and render the skin smooth.

Then they are stretched, as before, in the river, and the same operation repeated on the wool side; then thrown into a tub of water and bran, which is brewed among the skins till the greater part sticks to them; and then separated into distinct tubs, till they swell, and rise of themselves, above the water.

By these means, the remains of the lime are cleared out; they are then wrung out, hung up to dry on ropes, and sent to the mill, with the quantity of oil necessary to fill them; the best oil is that of cod-fish.

Here they are first thrown in bundles into the river for twelve hours, then laid in the mill-trough, and fulled without oil, till they are well softened; then oiled with the hand, one by one, and thus formed into parcels of four skins each, which are milled, and dried on cords a second time, then a third; then oiled again, and dried.

This is repeated as often as necessary; when done, if any moisture remains they are dried in a stove, and made up in parcels wrapped up in wool; after some time they are opened to the air, but wrapped up again as before, till the oil seems to have lost all its force, which it ordinarily does in twenty-four hours.

To scour the skins.

The skins are now returned to the chamoiser, to be scoured; by putting them into a lixivium of wood-ashes, working and beating them in it with poles, and leaving them to steep till the ley has had its effect; then wrung out, steeped in another lixivium, wrung again, and this repeated till the grease and oil are purged out. They are then half-dried, and passed over a sharp-edged iron instrument, placed perpendicularly in a block, which opens and softens them: lastly, they are thoroughly dried, and passed over the same instrument again, which finishes the preparation.

Kid and goat skins.

Kid, and goat-skins, are chamoised in the same manner as those of sheep, excepting that the hair is taken off by heat; and that when brought from the mill they undergo a preparation called ramalling, the most difficult of all.

It consists in this, that as soon as brought from the mill they are steeped in a fit lixivium; taken out, stretched on a round wooden leg, and the hair scraped off with the knife; this makes them smooth, and in working cast a fine nap. The difficulty is in scraping them evenly.

To dress hare, mole, or rabbit skins.

Take a tea-spoonful of alum, and two of saltpetre, both finely powdered: mix them well; sprinkle the powder on the flesh side of the skins, then lay the two salted sides together, leaving the fur outward; roll the skin exceedingly tight, and tie it round with packthread; hang it in a dry place for some days, then open it, and if sufficiently dry scrape it quite clean with a blunt knife, and keep it in a dry situation. This finishes the process.

It may not be generally known, that the bitter apple bruised and put into muslin bags, will effectually prevent furs from being destroyed by moths.

To make parchment.

This article is manufactured from sheep skins, cleared from lime. The skin is stretched on a frame where the flesh is pared off with an iron circular knife; it is then moistened with a rag, and whiting spread over it; the workman then, with a large pumice-stone, flat at the bottom, rubs over the skin, and scours off the flesh. He next goes over it with the iron instrument as before, and rubs it carefully with the pumice-stone without chalk; this serves to smooth the flesh-side. He drains it again by passing over it the iron instrument as before; he passes it over the wool side, then stretches it tight on a frame. He now throws more whiting and sweeps it over with a piece of woolly lamb-skin. It is now dried, and taken off the frame by cutting it all round. Thus prepared, it is taken out of the skinner's hands by the parchment maker, who, while it is dry, pares it on a summer, (which is a calf-skin stretched in a frame,) with a sharper instrument than that used by the skinner, who, working it with the arm from the top to the bottom of the skin, takes away about half its substance. It is again rendered smooth by the pumice-stone, which leaves the parchment finished.

To convert old parchment or vellum into leather.

Soak and wash the skins well and often in soft water for 24 hours; then remove them for the same period into a bath composed of 1 1-2 lb. of white vitriol, 1 lb. of cream of tartar, and 1 oz. of sal ammoniac, dissolved in 20 gallons of water. Next add 10 lbs. of vitriolic acid, 1 lb. of nitric acid, and 1 pint of spirit of salt, in which steep the skins for a short time to purge away the old lime: next wash them clear of the acid, and rinse them as dry as possible, without damaging the skins. They are then to be put into a tanning liquor, composed of 20 lbs. of oak bark, 7 lbs. of sumach, 5 lbs. of elm-bark, 3 lbs. of sassafras, and the same quantity of lignum vitæ shavings, portioned to 20 gallons of water, and previously warmed for 12 hours, and cooled down to a new-milk warmth, before the skins are immersed.

To make vellum.

This is a species of parchment made of the skins of abortives, or suckling calves: it has a much finer grain, and is white and smoother than parchment, but is prepared in the same manner, except its not being passed through the lime-pit. The article is used for binding superior books, and covering of drum heads.

To preserve leather from mould.

Pyroligneous acid may be used with success in preserving leather from the attacks of mouldiness, and is serviceable in recovering it after it has received that species of damage, by passing it over the surface of the hide or skin, first taking due care to expunge the mouldy spots by the application of a dry cloth. This remedy will prove of equal service if applied to boots, shoes, &c. when damaged in the same manner.

To curry leather.

This process prepares leather to be made up into boots, shoes, saddles, &c. and is performed upon the flesh or grain: in dressing on the flesh, the first operation is soaking the leather until it be thoroughly wet, then the flesh side is shaved on a wooden beam. The knife used is of a rectangular form with a handle at each end, and a double edge; after the skin is properly shaved, it is thrown into water again and scoured upon a board by rubbing the grain or hair side with a piece of pumice-stone, by which means substance is produced out of the leather called "the bloom." The hide is then conveyed to the drying place when the substance is applied, consisting of a mixture of cod oil and Russian tallow, principally upon the flesh side; it is now waxed, which is done by rubbing it with a brush dipped in oil and lamp black on the flesh side; it is then sized with a brush or sponge dried and tallowed; this is called wax leather. To black leather on the grain the first operation is the same till it is scoured. Then a brush dipped in urine is rubbed over the leather, and after it is dry it is again rubbed over with a brush dipped in copperas water, and after, the grain is raised by a fine graining board, when it is finished and fit for the shoe-maker's use.

To dye Morocco and sheep leather.

The following colours may be imparted to leather, according to the various uses for which it is intended.

Blue.

Blue is given by steeping the subject a day in urine and indigo, then boiling it with alum; or it may be given by tempering the indigo with red wine, and washing the skins therewith.

Another.—Boil elder berries, or dwarf elder, then smear and wash the skins therewith, and wring them out; then boil the berries as before in a solution of alum water, and wet the skins in the same manner, once or twice; dry them, and they will be very blue.

Red.

Red is given by washing the skins, and laying them 2 hours in galls; then wringing them out, dipping them in a liquor made with ligustrum, alum, and verdigris, in water; and lastly in a dye made of Brazil-wood boiled with ley.

Purple.

Purple is given by wetting the skins with a solution of roche alum in warm water, and when dry, again rubbing them with the hand, with a decoction of logwood in cold water.

Green.

Green is given by smearing the skin with sap-green and alum water boiled.

Dark green.

Dark green is given with steel filings and sal ammoniac, steeped in urine till soft, then smeared over the skin, which is to be dried in the shade.

Yellow.

Yellow is given by smearing the skin over with aloes and linseed oil, dissolved and strained, or by infusing it in weld.

Light orange.

Orange colour is given by smearing with fustic berries, boiled in alum water; or, for a deep orange, with turmeric.

Sky colour.

Sky-colour is given with indigo steeped in boiling water, and the next morning warmed and smeared over the skin.

HORTICULTURE.

To choose the best soil for a garden.

Prefer a sandy loam, not less than two feet deep, and good earth not of a binding nature in summer, nor retentive of rain in winter; but of such a texture, that it can be worked without difficulty, in any season of the year. There are few sorts of fruit-trees, or esculent vegetables, which require less depth of earth to grow in than two feet to bring them to perfection, and if the earth of the kitchen-garden be three or more feet deep, so much the better; for when the plants are in a state of maturity, if the roots, even of peas, spinach, kidney beans, lettuce, &c. be minutely traced, they will be found to penetrate into the earth, in search of food, to the depth of two feet, provided the soil be of a nature that allows them. If it can be done, a garden should be made on land whose bottom is not of a springy wet nature. If this rule can be observed, draining will be unnecessary; for when land is well prepared for the growth of fruit-trees and esculent vegetables, by trenching, manuring, and digging, it is by these means brought into such a porous temperament, that the rains pass through it without being detained longer than necessary. If the land of a garden be of too strong a nature, it should be well mixed with sand, or scrapings of roads, where stones have been ground to pieces by carriages.

To make gravel walks.

The bottom should be laid with lime-rubbish, large flint stones, or any other hard matter, for eight or ten inches think, to keep weeds from growing through, and over this the gravel is to be laid six or eight inches thick. This should be laid rounding up in the middle, by which means the larger stones will run off to the sides, and may be raked away; for the gravel should never be screened before it is laid on. It is a common mistake to lay these walks too round, which not only makes them uneasy to walk upon, but takes off from their apparent breadth. One inch in five feet is a sufficient proportion for the rise in the middle; so that a walk of twenty feet wide should be four inches higher at the middle than at the edges, and so in proportion. As soon as the gravel is laid, it should be raked, and the large stones thrown back again; then the whole should be rolled both lengthwise and crosswise; and the person who draws the roller should wear shoes with flat heels, that he may make no holes, because holes made in a new walk are not easily remedied. The walks should always be rolled three or four times after very hard showers, from which they will bind more firmly than otherwise they could ever be made to do.

To prepare hot beds, manures, and composts.

Stable-dung is in the most general use for forming hot-beds, which are masses of this dung after it has undergone its violent fermentation.

Bark is only preferable to dung, because the substance which undergoes the process of putrid fermentation requires longer time to decay. Hence it is found useful in the bark pits of hot-houses, as requiring to be seldomer moved or renewed than dung, or any other substance.

Leaves, and especially oak leaves, come the nearest to bark, and have the additional advantage, that when perfectly rotten like dung, they form a rich mould, or excellent manure.

The object of preparation in these three substances being to get rid of the violent heat which is produced when the fermentation is most powerful, it is obvious that preparation must consist in facilitating the process. For this purpose, a certain degree of moisture and air in the fermenting bodies are requisite; and hence the business of the gardener is to turn them over frequently, and apply water when the process appears impeded, and exclude rain, when chilled with too much water.

Recent stable dung generally requires to lie a month in ridges or beds, and be turned over in that time thrice before it is fit for cucumber-beds of the common construction; but for Mc Phail's hot-beds, or for linings, or for frames with moveable bottoms, three weeks, a fortnight, or less, will suffice; or no time at all need be given, but the dung formed at once into linings. Tan and leaves require, in general, a month. Fermentation is always most rapid in summer; and if the materials are spread abroad during frost, it is totally impeded. In winter the process of preparation generally goes on under the back sheds; which situation is also the best in summer, as full exposure to the sun and wind dries too much the exterior surface; but where sheds cannot be had, it will go on very well in the open air. Some cultivators have devised plans to economise heat by fermenting dung in vineries which are just beginning to be forced, or in vaults under pine pits, or plant stoves.

To form dung-beds.

In general, such beds are formed on a level surface; but Mr. T. A. Knight's plan is, to form a surface of earth as a basis, which shall incline to the horizon to the extent of 15 degrees: on this he forms the dung-bed to the same inclination; and finally, the frame, when placed on such a bed, if, as is usual, it be deepest behind, will present its glass at an angle of 20 degrees instead of 6 or 8, which is, undoubtedly, of great advantage in the winter season.

Ashes are often mixed with the dung of hot-beds, and are supposed to promote the steadiness and duration of their heat; and at least to revive it, if somewhat decayed. Tan leaves have also been used for the same purpose; and it is generally found that about one-third of tan and two-thirds of dung, will form a more durable and less violent heat, than a bed wholly of dung. The heat of dung beds is revived by linings or collateral and surrounding walls or banks of fresh dung, the old dung of the bed being previously cut down close to the frames; and, in severe weather, the sides of the bed are often protected by bundles of straw or faggots.

The residuum of heats, properly reduced by keeping, is a good simple manure for most fruit-trees, and excellent in a compost; but where the soil is naturally cold, a little ashes of coals, wood, straw, or burnt turf, or a minute proportion of soot, ought to be incorporated with it. Hog-dung has a peculiar virtue in invigorating weak trees. Rotted turf, or any vegetable refuse, is a general manure, excellent for all soils not already too rich. One of the best correctives of too rich a soil is drift sand. For an exhausted soil, where a fruit-tree that has been an old profitable occupant is wished to be continued, a dressing of animal matter is a powerful restorative; such as hogs' or bullocks' blood, offal from the slaughter-house, refuse of skins and leather, decomposed carrion, &c. The drainings of dung, laid on as mulch, are highly serviceable.—*Abercrombie.*

It is very proper to crop the ground among new-planted orchard-trees for a few years, in order to defray the expense of hoeing and cultivating it, which should be done until the temporary plants are removed, and the whole be sown down in grass. As the trees begin to produce fruit, begin also to relinquish cropping. When by their productions they defray all expenses, crop no longer.

To make composts for manure.

During hot weather, says Knight, I have all the offals in the garden, such as weeds, leaves of strawberries, and other vegetables, short grass, peas, and asparagus haulm, with the foliage of trees and shrubs when newly shed, carefully collected into a heap. These are all turned over and mixed during the winter, that they may be sufficiently rotted to mix with the dung against the end of summer. I have also another heap formed with the prunings from gooseberry and currant bushes, fruit-trees, raspberry-shoots, clippings of box-edgings, and loppings from shrubs; also the roots of greens and cabbages: which are generally burnt at two different periods in the year, viz. in spring and autumn, but previous to each burning, I endeavour to pare up all the coarse grasses around the garden, with a portion of the soil adhering thereto; and whenever these are sufficiently dried, have them collected to the heap intended to be burnt. The fire is kindled at a convenient distance from the heaps, and a portion of such as burn most easily is first applied, until the fire has gained a considerable power. After this, the process of burning is continued, by applying lighter and heavier substances alternately, that the one may preserve the action of the fire, and the other prevent it from reducing them too much to ashes. When the whole are thus consumed, a quantity of mould is thrown over the heap to prevent the fire from breaking through; and whenever it can be broke into with safety, it is then mixed up into a dung-hill with the rotted vegetables, moss-earth, and stable yard dung, in such proportions as is likely to insure a moderate fermentation, which is generally completed in three or four weeks; at which time it is most advantageously applied, in having it carried to the ground, and instantly dug in.

To make composts for moulds.

Composts are mixtures of several earths, or earthy substances or dungs, either for the improvement of the general soil under culture, or for the culture of particular plants.

In respect to composts for the amendment of the general soil of the garden, their quality must depend upon that of the natural soil: if this be light, loose, or sandy, it may be assisted by heavy loams, clays, &c. from ponds and ditches, cleanings of sewers, &c. On the other hand, heavy, clayey, and all stubborn soils, may be assisted by light composts of sandy earth, drift, and sea-sand, the shovelings of turnpike roads, the cleansing of streets, all kinds of ashes, rotten tanner's bark, rotten wood, saw dust, and other similar light opening materials, that can be most conveniently procured.

To make composts for plants.

These may be reduced to light sandy loam from old pastures: strong loam approaching nearly to brick earth from the same source: peat earth from the surface of heaths or commons; bog earth, from bogs or morasses; vegetable earth, from decayed leaves, stalks, cow dung, &c. sand, either sea-sand, drift-sand, or powdered stone, so as to be as free as possible from iron; lime-rubbish; and lastly common garden earth. There are no known plants that will not grow or thrive in one or other of these earths, alone or mixed with some other earth, or with rotten dung, or leaves. Nurserymen have seldom more than three sorts of earth: loam, approaching to the qualities of brick-earth; peat or bog-earth; and the common soil of their nursery. With these and the addition of a little sand for striking plants, some sifted lime rubbish, for succulents, and some well-rotted cow-dung for bulbs, and some sorts of trees, they continue to grow thousands of different speeies in as great or greater perfection as in their native countries, and many, as the pine, vine, camelia, rose, &c. in a superior manner.

To prepare composts.

The preparation neeessary for heavy and light composts for general enriehment, and of the above different earths, eonsists in collecting eaeh soil in the compost ground, in separate ridges of three or four feet broad, and as high, turning them every six weeks or two months for a year or a year and a half before they are used. Peat earth, being generally proeured in the state of turves full of the roots and tops of heath, requires 2 or 3 years to rot; but, after it has lain one year, it may be sifted, and what passes through a small sieve will be fonnd fit for use. Some nurscrymen use both these loams and peats as soon as proeured, and find them answer perfeetly for most plants; but for delicate flowers, and especially bulbs, and all florists' flowers, and for all eomposts in whieh manures enter, not less than one year ought to be allowed for decomposition, and what is ealled sweetening.

To make a green-house or conservatory.

The depth of green-houses should never be greater than their height in the clear; which, in small or middling houses may be 16 or 18 feet, but in large ones from 20 to 24 feet; and the length of the windows should reaeh from about one foot and a half above the pavement, and within the same distanee of the ceiling.

The floor of the green-house, whieh should be laid either with Bremen squares, Purbeck stone or flat tiles, must be raised two feet above the surface of the adjoining ground, or if the situation be damp, at least three feet; and if the whole is arched with low brick arches under the floor, they will be of great serviee in preventing damps; and under the floor about two feet from the front, it will be very advisable to make a flue of ten inehes wide and two feet deep; this should be earried the whole length of the house, and then returned back along the hinder part, and there be earried up into funnels adjoining to the tool-house, by whieh the smoke may be carried off. The fire-place may be eontrived at one end of the house, and the door at whieh the fuel is put in, as also the ash-grate, may be contrived to open into the tool-house.

Whilst the front of the green-house is exactly south, one of the wings may be made to face the south-east, and the other the south-west. By this disposition the heat of the sun is refleeted from one part of the building to the other all day, and the front of the main green-house is guarded from the cold winds. These two wings may be so contrived as to maintain plants of different degrees of hardiness, which may be easily effected by the situation and extent of the fire-place, and the manner of conducting the flues.

The sloping glasses of these houses should be made to slide and take off, so that they may be drawn down more or less in warm weather to admit the air to the plants; and the upright glasses in the front may be so contrived as that every other may open as doors upon hinges, and the alternate glasses may be divided into two; the upper part of eaeh should be so contrived as to be drawn down like sashes, so that either of them may be used to admit air in a greater or less quantity as there may be oceasion. As to the management of plants in a green-house, open the mould about them from time to time, and sprinkle a little fresh mould in them, and a little warm dung on that; also water them when the leaves begin to wither and curl, and not oftener, whieh would make them fade and be siekly: and take off such leaves as wither and grow dry.

To propagate vegetables.

Plants are universally propagated by seed, but partially also by germs or bulbs, suckers, runners, slips, and off-sets, and artificially by layers, inn-arching, grafting, budding, and cutting.

The propagation by seed is to make sure of live seeds; for some lose their vitality very early after being gathered, while others retain it only for one or perhaps two seasons; some seeds also are injured, and others improved by keeping. The size of seeds requires also to be taken into consideration, for on this most frequently depends the depth whieh they require to be buried in the soil; the texture of their skin or eovering must be attended to, as on this often depends the time they require to be buried in the soil previously to germination. On the form and surface of the outer coating of seeds sometimes depends the mode of sowing, as in the carrot, and on their qualities in general depends their liability to be attaeked by insects. The nature of the offspring expects it, and the proper climate, soil, and season, require also to be kept in view in determining how, where, when, and in what quantity, any seeds must de sown.

Germs or bulbs, eauline or radical, require in general to be planted immediately, or soon after removal from the parent plant, in light earth, about their own depth from the surfaee. Matured bulbs may be preserved out of the soil for some months, without injury to their vitality; but infant bulbs are easily dried up and injured when so treated.

Slips are shoots which spring from the collar or the upper part of the roots of herbaceous plants, as in auricular, and under shrubs, as thyme, &c. The shoot when the lower part from whence the roots proeeed, begins to ripen or acquire a firm texture, is to be slipped or drawn from the parent plant, so far as to bring off a heel or elaw of old wood, stem, or root, on which generally some roots, or rudiments of roots, are attaehed. The ragged parts and edges of this claw or rough section are then to be smoothed with a sharp knife, and the slip to be planted in suitable soil and shaded till it strikes root afresh.

The division of the plant is adopted in many species, as in grasses, the daisy, polyanthus, and a great variety of others. The plant is taken up, the earth shaken from its roots; the whole is then separated, each piece containing a portion of root and stem, which may be planted without farther preparation.

With certain species *runners* is a convenient and sure mode of propagation. All that is requisite is, to allow the plantlet on the shoot, or runner, to be well rooted before being separated from the parent. It may then be planted where it is finally to remain.

Suckers are merely runners under ground: some run to a considerable distance, as the acacia, narrow-leaved elm, sea-lime grass, &c.; others again are more limited in their migrations, as the lilac, syringa, Jerusalem artichoke, saponaria, &c. All that is necessary is, to dig them up, cut off each plantlet with a portion of root, after which its top may be reduced by cutting off from one-fourth to one-half of the shoot, in order to fit it to the curtailed root, and it may then be planted, either in the nursery department, or, if a strong plant, where it is finally to remain.

Propagation by layering.

In general, the operation of layering in trees and shrubs is commenced before the ascent of the sap, or delayed till the ascent is fully up. The shoot, or extremity of the shoot, intended to become a new plant, is half separated from the parent plant, at a few inches distance from its extremity, and while this permits the ascent of the sap at the season of its rising, the remaining half of the stem, being cut through and separated, forms a dam or sluice to the descending sap, which, thus interrupted in its progress, exudes at the wound, in the form of a granulous protuberance, which throws out roots. If the cut or notch in the stem does not penetrate at least half way through, some sort of trees will not form a nucleus the first season; on the other hand, if the notch be nearly cut through the shoot, a sufficiency of alburnum, or soft wood, is not left for the ascent of the sap, and the shoot dies. In delicate sorts it is not sufficient to cut a notch merely, because in that case, the descending sap, instead of throwing out granulated matter, in the upper side of the wound, would descend by the entire side of the shoot; therefore, besides a notch formed by cutting out a portion of bark and wood, the notched side is slit up at least one inch, separating it by a bit of twig, or small splinter of stone or potsherd. The operation of layering is performed on herbaceous plants, as well as trees; and the part to become the future plant is, in both cases, covered with soil about a third of its length.

When the layers are rooted, which will generally be the case by the autumn after the operation is performed, they are cleared from the stools or main-plants, and the head of each stool, if to be continued for furnishing layers, should be dressed; cutting off all decayed scraggy parts, and digging the ground round them. Some fresh rich mould should also be worked in, in order to encourage the production of the annual supply of shoots for layering.

Propagation by inn-arching.

A sort of layering, by the common or slit process, in which the talus, or heel, intended to throw out fibres, instead of being inserted in the soil, is inserted in the wood, or between the wood and bark of another plant, so as to incorporate with it. It is the most certain mode of propagation with plants difficult to excite to a disposition for rooting; and when all other modes fail, this, when a proper description of stock or basis is to be found, is sure to succeed.

The stocks designed to be inn-arched, and the tree from which the layer or shoot is to be bent or *arched* towards them, and put *in* or united, must be *placed*, if in pots, or planted if in the open soil, near together. Hardy trees of free growing kinds should have a circle of stocks planted round them every year in the same circumference, every other one being inn-arched the one year, and when removed, their place supplied by others. If the branches of the tree are too high for stocks in the ground, they should be planted in pots, and elevated on posts or stands, or supported from the tree, &c.

To perform the operation, having made one of the most convenient branches or shoots approach the stock, mark, on the body of the shoot, the part where it will most easily join to the stock; and in that part of each shoot pare away the bark and part of the wood 2 or 3 inches in length, and in the same manner pare the stock in the proper place for the junction of the shoot; next make a slit upwards in that part of the branch or shoot, as in layering, and make a slit downward in the stock to admit it. Let the parts be then joined, slipping the tongue of the shoot into the slit of the stock, making both join in an exact manner, and tie them closely together with bags. Cover the whole afterwards, with a due quantity of tempered or grafting clay or moss. In hot-houses, care must be taken not to disturb the pots containing the plants operated on.

By budding.

Budding, or as it is sometimes called, grafting by gems, consists in taking an eye or bud attached to a portion of the bark of ligneous vegetables, of different sizes and forms, and generally called a shield, and transplanting it to another or a different ligneous vegetable. The object in view is precisely that of grafting, and depends on the same principle; all the difference between a bud and a scion being, that a bud is a shoot or scion in embryo. Budded trees are two years later in producing their fruit than grafted ones; but the advantage of budding is, that where a tree is rare, a new plant can be got from every eye, whereas by grafting it can only be got from every three or four eyes. There are also trees which propagate much more readily by budding than grafting; and others, as most of the stone fruits, are apt to throw out gum when grafted. Budding is performed from the beginning of July to the middle of August, the criterion being the formation of the buds in the axillæ of the leaf of the present year.

The buds are known to be ready by the shield or portion of bark to which they are attached, easily parting with the wood.

Shield budding

Is performed as follows:—Fix on a smooth part on the side of the stock, rather from than towards the sun, and of a height depending, as in grafting, on whether dwarf, half, or whole standard trees are desired; then, with the budding knife, make a horizontal cut across the rind quite through the firm wood; from the middle of this transverse cut make a slit downward perpendicularly, an inch or more long, going also quite through to the wood. Proceed with expedition to take off a bud; holding the cutting, or scion, in one hand, with the thickest end outward, and with the knife in the other hand, enter it about half an inch or more below a bud, cutting nearly half-way into the wood of the shoot, continuing it with one clean slanting cut, about half an inch more above the bud, so deep as to take off part of the wood along with it, the whole about an inch and a half long; then directly with the thumb and finger, or point of the knife, slip off the woody part remaining to the bud; which done, observe whether the eye or gem of the bud remains perfect: if not, and a little hole appears in that part, the bud has lost its root, and another must be prepared. This done, place the back part of the bud or shield between the lips, and with the flat haft of the knife, separate the bark of the stock on each side of the perpendicular cut, clear to the wood, for the admission of the bud, which directly slip down close between the wood and bark to the bottom of the slit. Next cut off the top part of the shield even with the horizontal cut, in order to let it completely into its place, and to join exactly the upper edge of the shield with the transverse cut, that the descending sap may immediately enter the back of the shield, and protrude granulated matter between it and the wood, so as to effect a living union. The parts are to be bound round with a ligament of fresh bass, previously soaked in water, to render it pliable and tough; begin a little below the bottom of the perpendicular slit, proceeding upward closely round every part, except just over the eye of the bud, and continue it a little above the horizontal cut, not too tight, but just sufficient to keep the hole close, and exclude the air, sun, and wet.

Another method of budding.

Trees are generally budded by making a transverse section in the bark of the stock, and a perpendicular slit beneath it; the bud is then pushed down to give it the position which it is to have. This operation is not always successful, and it is better to employ an inverse or contrary method by making the vertical slit above the transverse section or cut, and pushing the bark containing the bud upwards into its proper position. This method very rarely fails of success, because, as the sap descends by the bark, the bud placed above the transverse section receives abundance, whereas, if it be placed below the section, very little sap can ever get to it to promote the growth of the bud. Oil rubbed upon the stems and branches of fruit trees destroys insects, and increases the fruit-buds. Used upon the stems of carnations, it guards them against the depredations of the ear-wig. The coarsest oil will suit, and only a small quantity is required.

To bud with double ligatures.

This is a new and expeditious mode of budding by Mr. T. A. Knight. The operations are performed in the manner above stated; but, instead of one ligature, two are applied; one above the bud, inserted upon the transverse section, through the bark; the other applied below in the usual way. As soon as the buds have attached themselves, the lower ligatures are taken off, but the others are suffered to remain. The passage of the sap upwards is in consequence much obstructed, and the inserted buds begin to vegetate strongly in July (being inserted in June); and when these have afforded shoots about four inches long, the remaining ligatures are taken off, to permit the excess of sap to pass on; and the young shoots are nailed to the wall. Being there properly exposed to light, their wood will ripen well, and afford blossoms in the succeeding Spring.

To graft trees.

This is a mode of propagation applicable to most sorts of trees and shrubs; but not easily to very small under-shrubs, as heath or herbaceous vegetables. It is chiefly used for continuing varieties of fruit trees. A grafted tree consists of two parts, the scion and the stock; their union constitutes the graft, and the performance of the operation is called grafting.

The end of grafting is, first, to preserve and multiply varieties and sub-varieties of fruit trees, endowed accidentally or otherwise with particular qualities, which cannot be with certainty transferred to their offspring by seeds, and which would be multiplied too slowly, or ineffectually, by any other mode of propagation.

Second, to accelerate the fructification of trees, barren as well as fruit-bearing; for example, suppose two acorns of a new species of oak, received from a distant country; sow both, and after they have grown one or two years, cut one of them over, and graft the part cut off on a common oak of five or six years' growth; the consequence will be, that the whole nourishment of this young tree of five years' growth being directed towards nourishing the scion of one or two years' it will grow much faster, and consequently arrive at perfection much sooner than its fellow, or its own root left in the ground.

The third use of grafting is to improve the quality of fruits; and the fourth to perpetuate varieties of ornamental trees or shrubs.

Materials used in grafting.

Procure a strong pruning-knife for cutting off the heads of the stocks previous to their preparations by the grafting-knife for the scion; a small saw for larger stocks; and a pen-knife for very small scions; chisel and mallet for cleft grafting; bass ribbons as ligatures: and grafting-clay.

To prepare grafting clay.

Grafting-clay is prepared either from stiff yellow or blue clay, or from clayey loam or brick earth; in either case, adding thereto about a fourth part of fresh horse dung, free from litter, and a portion of cut hay, mixing the whole well together, and adding a little water: then let the whole be well beaten with a stick upon a floor, or other hard substance; and as it becomes too dry apply more water: at every beating, turning it over; and continuing beating it well at top till it becomes flat and soft. This process must be repeated more or less, according as the nature of the clay may require to render it ductile, and yet not so tough as to be apt to crack in dry weather.

Whip grafting.

Whip—or, as it is sometimes called, tongue—grafting, is the most generally adopted in nurseries for propagating fruit-trees. To effect this mode in the best style, the top of the stock, and the extremity of the scions, should be nearly of equal diameter. Hence this variety admits of being performed on smaller stocks than on any other. It is called whip-grafting, from the method of cutting the stock and scions sloping on one side so as to fit each other, and thus tied together in the manner of a whip-thong to the shaft or handle.

The scion and stock being cut off obliquely at corresponding angles, as near as the operator can guess; then cut off the tip of the stock obliquely, or nearly horizontally; make now a slit nearly in the centre of the sloped face of the stock downwards, and a similar one in the scion upwards. The tongue or wedge-like process, forming the upper part of the sloping face of the scion, is then inserted downwards in the cleft of the stock; the inner barks of both being brought closely to unite on one side so as not to be displaced in tying, which ought to be done immediately with a ribband of bass, brought, in a neat manner, several times round the stock, and which is generally done from right to left, or in the course of the sun. The next operation is to clay the whole over an inch thick on every side, from about half an inch or more below the bottom of the graft, to an inch over the top of the stock, finishing the whole coat of clay in a kind of oval globular form, rather longways up and down, closing it effectually about the scion and every part, so as no light, wet, nor wind, may penetrate; to prevent which is the whole intention of claying.

Cleft grafting.

This is resorted to in the case of strong stocks, or in heading down and re-grafting old trees. The head of the stock or branch is first cut off obliquely, and then the sloped part is cut over horizontally near the middle of the slope; a cleft nearly two inches long is made with a stout knife or chisel in the crown downwards, at right angles to the sloped part, taking care not to divide the pith. This cleft is kept open by the knife. The scion has its extremity for about an inch and a half, cut into the form of a wedge; it is left about the eighth of an inch thicker on the outer side, and brought to a fine edge on the inside. It is then inserted into the opening prepared for it; and the knife being withdrawn, the stock closes firmly upon it.

Crown grafting.

This is another mode adopted for thick stocks, shortened branches, or headed down trees. It is sometimes called grafting in the bark or rind, from the scion being inserted between the bark and wood. This mode of grafting is performed with best effect, somewhat later than the others, as the motion of the sap renders the bark and wood of the stock much more easily separated for the admission of the scions.

In performing this operation, first cut or saw off the head of the stock or branch horizontally or level, and pare the top smooth; then having the scions cut one side of each flat, and somewhat sloping, an inch and a half long, forming a sort of shoulder at the top of the slope, to rest upon the crown of the stock; and then raise the rind of the stock with the ivory wedge, forming the handle of the budding knife; so as to admit the scion between that and the wood 2 inches down; which done, place the scion with the cut side next the wood, thrusting it down far enough for the shoulder to rest upon the top of the stock; and in this manner may be put three, four, five, or more scions, in one large stock or branch. It is alleged as a disadvantage attending this method in exposed situations, that the ingrafted shoots for two or three years are liable to be blown out of the stock by violent winds; the only remedy for which is, tying long rods to the body of the stock or branch, and tying up each scion and its shoots to one of the rods.

Side grafting.

This method resembles whip grafting, but differs in being performed on the side of the stock, without bending down. It is practised on wall trees, to fill up vacancies, and sometimes in order to have a variety of fruits upon the same tree. Having fixed upon those parts of the branches where wood is wanting to furnish the head or any part of the tree, then slope off the bark and a little of the wood, and cut the lower end of the scions to fit the part as near as possible, then join them to the branch, and tie them with bass, and clay them over.

Saddle grafting.

This is performed by first cutting the top of the stock into a wedge-like form, and then splitting up the end of the scion, and thinning off each half to a tongue-shape; it is then placed on the wedge, embracing it on each side, and the inner barks are made to join on one side of the stock, as in cleft grafting. This is a very strong and handsome mode, for standard trees, when grafted at the standard height. It is also desirable for orange trees, and rose standards, as it makes a handsome finish, covering a part of the stock, which, by the other methods, long remains a black scar, and sometimes never becomes covered with bark. The stocks for this purpose should not be much thicker than the scions, or two scions may be inserted.

Shoulder or chink grafting.

This is performed with a shoulder, and sometimes also with a stay at the bottom of the slope. It is chiefly used for ornamental trees, where the scion and stock are of the same size.

Root grafting.

Root-grafting is sometimes performed in nurseries on parts of the roots of removed trees, when the proper stocks are scarce; in which case, the root of the white thorn has been resorted to as a stock both for the apple and pear. In general, however, a piece of the root of the tree of the same genus is selected, well furnished with fibres, and a scion placed on it in any of the ordinary ways for small stocks. Thus united, they are planted so deep as to cover the ball of clay, and leave only a few eyes of the scion above ground.

In a month after grafting, it may be ascertained whether the scion has united with the stock, by observing the progress of its buds; but in general it is not safe to remove the clay for three months or more, till the graft be completely cicatrized. The clay may generally be taken off in July or August, and at the same time the ligature loosened where the scion seems to require more room to expand: a few weeks afterwards, when the parts have been thus partially inured to the air, and when there is no danger of the scion being blown off by winds, the whole of the ligatures may be removed.

To choose scions.

Scions are those shoots which, united with the stock, form the graft. They should be gathered several weeks before the season for grafting arrives. It is desirable that the sap of the stock should be in brisk motion at the time of grafting; but by this time the buds of the scion, if left on the parent tree, would be equally advanced, whereas the scions, being gathered early, the buds are kept back, and ready only to swell out when placed on the stock. Scions of pears, plums, and cherries, are collected in the end of January, or beginning of February. They are kept at full length sunk in dry earth, and out of the reach of frost till wanted, which is sometimes from the middle of February to the middle of March. Scions of apples are collected any time in February, and put in from the middle to the end of March. In July-grafting, the scions are used as gathered.

To choose cuttings.

In respect to the choice of cuttings, those branches of trees and shrubs which are thrown out nearest the ground, and especially such as recline, or nearly so, on the earth's surface, have always the most tendency to produce roots. Even the branches of resinous trees, which are extremely difficult to propagate by cuttings, when reclining on the ground, if accidentally, or otherwise covered with earth in any part, will there throw out roots, and the extremity of the lateral shoot will assume the character of a main stem, as may be sometimes seen in the larch, spruce, and silver fir.

The choice of cuttings then is to be made from the side shoots of plants, rather than from their summits or main stems; and the strength and health of side shoots being equal, those nearest the ground should be preferred. The proper time for taking cuttings from the mother plant, is when the sap is in full motion, in order that, in returning by the bark, it may form a callus or protruding ring of granular substance, between the bark and wood, whence the roots proceed. As this callus, or ring of spongy matter, is generally best formed in ripened wood, the cutting, when taken from the mother plant, should contain a part of the former year, or in plants which grow twice a year, of the wood of the former growth; or in the case of plants which are continually growing, as most evergreen exotics, such wood as has begun to ripen, or assume a brownish colour. This is the true principle of the choice of cuttings as to time; but there are many sorts of trees, as willow, elder, &c. the cuttings of which will grow almost at any season, and especially if removed from the mother plant in winter, when the sap is at rest.

These ought always to be cut across, with the smoothest and soundest section possible, at an eye or joint. And as buds are in a more advanced state in wood somewhat ripened or fully formed, than in forming wood, this section ought to be made in the wood of the growth of the preceding season; or as it were in the point between the two growths. It is a common practice to cut off the whole or a part of the leaves of cuttings, which is always attended with bad effects in evergreens, in which the leaves may be said to supply nourishment to the cutting till it can sustain itself. This is very obvious in the case of striking from buds, which, without a leaf attached, speedily rot and die. Leaves alone will even strike root, and form plants in some instances, and the same may be stated of certain flowers and fruits.

Piping.

This is a mode of propagation by cuttings, and is adopted with plants having jointed tubular stems, as the dianthos tribe; and several of the grasses, and the arundus may be propagated in this manner. When the shoot has nearly done growing, its extremity is to be separated, at a part of the stem where it is nearly indurated, or ripened. This operation is effected by holding the root end between the finger and thumb of one hand, below a pair of leaves, and with the other pulling the top part above the pair of leaves, so as to separate it from the root part of the stem at the socket, formed by the axillæ of the leaves, leaving the stem to remain with a tubular termination. These pipings are inserted without any further preparation in finely sifted earth, to the depth of the first joint, or pipe.

To insert cuttings.

Cuttings, if inserted in a mere mass of earth, will hardly throw out roots, while, if inserted at the sides of the pots, so as to touch the pot in their whole length, they seldom fail to become rooted plants. The art is to place them to touch the bottom of the pot, they are then to be plunged in a bark or hot-bed, and kept moist.

To manage cuttings.

No cutting requires to be planted deep; though the larger ought to be inserted deeper than such as are small. In the case of evergreens, the leaves should be kept from touching the soil, otherwise they will damp or rot off; and in the case of tubular stalked plants, which are in general not very easily struck, owing to the water lodging in the tube, and rotting the cutting, both ends may be advantageously inserted in the soil, and besides a greater certainty of success, two plants will be produced. Too much light, air, water, heat, or cold, are alike injurious. To guard against these extremes in tender sorts, the means hitherto devised, is that of inclosing an atmosphere over the cuttings, by means of a hand or bell-glass, according to their delicacy. This preserves an uniform stillness and moisture of atmosphere. Immersing the pot in earth has a tendency to preserve a steady uniform degree of moisture at the roots; and shading, or planting the cuttings, if in the open air in a shady situation, prevents the bad effects of excess of light. The only method of regulating the heat is by double or single coverings of glass, or mats, or both. A hand-glass placed over a bell-glass, will preserve in a shady situation, a very constant degree of heat.

What the degree of heat ought to be, is decided by the degree of heat requisite for the mother plant. Most species of the erica, dahlia, and geranium, strike better when supplied with rather more heat than is requisite for the growth of these plants in green-houses. The myrtle tribe, and camelias, require rather less; and in general a lesser portion of heat, and of every thing else proper for plants in their rooted and growing state is the safest.

To sow seeds with advantage.

This is the first operation of rearing. Where seeds are deposited singly, as in rows of beans, or large nuts, they are said to be planted, where dropt in numbers together, to be sown. The operation of sowing is either performed in drills, patches, or broadcast. Drills are small excavations formed with the draw-hoe, generally in straight lines parallel to each other, and in depth and distance apart, varying according to the size of the seeds. In these drills, the seeds are strewed from the hand of the operator, who taking a small quantity in the palm of his hand and fingers, regulates its emission by the thumb. Some seeds are very thinly sown, as the pea and spinage; others thick, as the cress, and small salading.

Patches are small circular excavations made with the trowel; in these, seeds are either sown or planted, thicker or thinner, covered more or less, according to their natures. This is the mode adopted in sowing in pots and generally in flower borders.

In broad-cast sowing, the operator scatters the seed over a considerable breadth of surface, previously prepared by digging, or otherwise being minutely pulverized. The seed is taken up in portions in the hand, and dispersed by a horizontal movement of the arm, to the extent of a semi-circle, opening the hand at the same time, and scattering the seeds in the air, so as they may fall, as equally as possible over the breadth taken in by the sower at once, and which is generally six feet; that being the diameter of the circle in which his hand moves through half the circumference. In sowing broad-cast on beds, and narrow strips or borders, the seeds are dispersed between the thumb and fingers by horizontal movements of the hand in segments of smaller circles.

Dry weather is essentially requisite for sowing, and more especially for the operation of covering in the seed, which in broad-cast sowing, is done by treading or gently rolling the surface, and then raking it; and in drill-sowing, by treading in the larger seeds, as peas, and covering with the rake; smaller seeds sown in drills, are covered with the same implements without treading.

To plant shrubs and trees.

Planting, as applied to seeds or seed-like roots, as potatoes, bulbs, &c. is most frequently performed in drills, or in separate holes made with the dibbler, in these, the seed or bulb is dropt from the hand, and covered with or without treading, according to its nature. Sometimes planting is performed in patches, as in pots or borders, in which case the trowel is the chief instrument used.

Quincunx, is a mode of planting in rows, by which the plants in the one row are always opposed to the blanks in the other, so that when a plot of ground is planted in this way, the plants appear in rows in four directions.

Planting as applied to plants already originated, consists generally in inserting them in the soil of the same depth, and in the same position as they were before removal, but with various exceptions. The principal object is to preserve the fibrous roots entire; to distribute them equally round the stem among the mould or finer soil, and to preserve the plant upright. The plant should not be planted deeper than it stood in the soil before removal, and commonly the same side should be kept towards the sun. Planting should, as much as possible, be accompanied by abundant watering in order to consolidate the soil about the roots; and where the soil is dry, or not a stiff clay, it may be performed in the beginning of wet weather, in gardens; and in forest planting, on dry soils, in all open weather, during autumn, winter, and spring.

To water gardens.

Watering becomes requisite in gardens for various purposes, as aliment to plants in a growing state, as support to newly transplanted plants, for keeping under insects, and keeping clean the leaves of vegetables. One general rule must be ever kept in mind during the employment of water in a garden; that is, never to water the top or leaves of a plant when the sun shines. All watering should be carried on in the evening or early in the morning, unless it be confined to watering the roots, in which case, transplanted plants, and others in a growing state, may be watered at any time; and if they are shaded from the sun, they may also be watered over their tops. Watering over the tops is performed with the rose, or dispenser attached to the spout of the watering-pot, or by the syringe or engine. Watering the roots is best done with the rose: but in the case of watering pots in haste, and where the earth is hardened, it is done with the naked spout. In new laid turf, or lawns of a loose porous soil, and too mossy surface, the water barrel may be advantageously used.

Many kitchen crops are lost, or produced of a very inferior quality, for want of watering. Lettuces and cabbages are often hard and stringy; turnips and radishes do not swell, onions decay, cauliflowers die off, and in general, in dry soils. Copious waterings in the evenings, during the dry season, would produce that fulness of scculency, which are found in the vegetables produced in the low countries, and in the Marsh Gardens at Paris; and in this country at the beginning and latter end of the season.

The watering the foliage of small trees to prevent the increase of insects and of strawberries, and fruit shrubs, to swell the fruit, is also of importance.

To water the foliage of wall trees.

Water is to be supplied to the garden from a reservoir, situated on an eminence, a considerable height above the garden walls. Around the whole garden, four inches below the surface of the ground, a groove, between two and three inces deep, has been formed in the walls, to receive a three-quarter inch pipe for conducting the water. About 50 feet distant from each other, are apertures through the wall, 2 1-2 feet high, and ten inches wide, in which a cock is placed, so that on turning the handle to either side of the wall, the water issues from that side. The nozzles of the cocks have screws on each side, to which is attached at pleasure a leathern pipe, with a brass cock and director; roses, pierced with holes of different sizes, being fitted to the latter. By this contrivance, all the trees, both inside and outside the wall, can be most effectually watered and washed, in a very short space of time, and with very little trouble. One man may go over the whole in two hours. At the same time the borders, and even a considerable part of the quarters can be watered with the greatest ease when required.

To transplant.

Transplanting consists in removing propagated plants, whether from seeds, cuttings, or grafts, according to their kinds and other circumstances, to a situation prepared to receive them. Transplanting, therefore, involves three things; first, the preparation of the soil, to which the plant is to be removed; secondly, the removal of the plant; thirdly, the insertion in the prepared soil.

The preparation of the soil implies, in all cases, stirring, loosening, mixing, and comminution: and, in many cases, the addition of manure or compost, according to the nature of the soil, and plant to be inserted, and according as the same may be in open ground, or pots or hot-houses.

The removal of the plant is generally effected by loosening the earth around it, and then drawing it out of the soil with the hand; in all cases avoiding as much as possible to break, or bruise, or otherwise injure the roots. In the case of small seedling plants, merely inserting the spade, and raising the portion of earth in which they grow will suffice; but in removing larger plants, it is necessary to dig a trench round the plant.

In some cases, the plant may be lifted with a ball of earth, containing all its roots, by means of the trowel; and in others, as in large shrubs or trees, it may be necessary to cut the roots at a certain distance from the plant, one year before removal, in order to furnish them with young fibres, to enable them to support the change. In pots less care is necessary, as the roots and ball of earth may be preserved entire.

To accelerate plants in hot-houses.

There are two leading modes of accelerating plants in these buildings; the first is by placing them there permanently, as in the case of the peach, vine, &c. planted in the ground: and the second is by having the plants in pots, and introducing or withdrawing them at pleasure. As far as respects trees, the longest crops, and with far less care, are produced by the first method: but in respect to herbaceous plants and shrubs, whether culinary, as the strawberry and kidney-bean, or ornamental, as the rose and the pink, the latter is by far the most convenient method. Where large pots are used, the peach, cherry, fig, &c. will produce tolerable crops. Vines and other fruit trees, when abundantly supplied with water and manure in a liquid state, require but a very small quantity of mould.

To protect vegetables from injuries by means of straw ropes.

This is effected by throwing the ropes in different directions over the trees, and sometimes depositing their ends in pails of water. It has been tried successfully on wall-trees, and on potatoes and other herbaceous vegetables. As soon as the buds of the trees become turgid, place poles against the wall, in front of the trees, at from 4 to 6 feet asunder; thrusting their lower ends into the earth, about a foot from the wall, and fastening them at the top with a strong nail, either to the wall or coping. Then procure a quantity of straw or hay-ropes, and begin at the top of one of the outer poles, making fast the end, and pass the rope from pole to pole, taking a round turn upon each, until the end is reached, when, after securing it well, begin about 18 inches below, and return in the same manner to the other end, and so on till within 2 feet of the ground. Straw ropes have also been found very useful in protecting other early crops from the effects of frost, as peas, potatoes, or kidney-beans, by fixing them along the rows with pins driven into the ground.

The same by nets.

The nets should be placed out at the distance of 15 or 18 inches from the tree: being kept off by looped sticks, with their butts placed against the wall, and at the distance of about a yard from each other. In order to make them stand firmly, the net should be first stretched tightly on, and be fastened on all sides. If the nets were doubled or trebled, and put on in this way, they would be a more effectual screen, as the meshes or openings would, in that case, be rendered very small. Woollen nets are deemed the best, and are now in general use in Scotland. In screening with nets of any kind, they are always to be left on night and day, till all danger be over.

The same by canvass screens.

This is effected either by placing moveable canvass cases over or around detached trees; portable hand-cases over herbaceous plants; tents or open sheds over the forests' productions; or frames or sheets against trees trained on walls. In all cases they should be placed clear of the tree or plants, either by extended, forked, or hooked sticks, or any other obvious resource.

To raise and manage fruit trees.

In the removal or transplantation of trees, gardeners and nurserymen are generally very careless and inattentive in taking them up, and care not how much the roots are broken or lessened in number, provided they have enough left to keep the tree alive; the consequence is, that although the branches left on remain alive, there is so great a deficiency of sap, from the loss of roots, that the vessels cannot be filled the following spring.

The roots are broken or cut off at random, and generally diminished more than one-half, or they are doubled back and distorted; and, if there be enough left to keep the plant alive, it is thought quite sufficient; and, by these means, the appearance of blossoms and fruit being prematurely produced, those stinted and deformed plants are sold as half or full-trained trees for four times the price of others; and when sold, they are again taken up, and the roots treated and diminished in the same careless manner.

When the soil of a garden, wherein fruit-trees are to be planted, is not naturally conformable or congenial to the first principle, it must be made so.

The top of a wall should be so formed as to throw off water; for otherwise it will generally be damped, which renders the trees unhealthy: and, when the substance against which the branches are fixed is dry, the temperature on all sides will be more equal.

In preparing beds or borders, due attention must be paid both to the soil and subsoil, as each equally affects the health and fruitfulness of trees: and, principally, as it retains or discharges water,—stagnant water being at all times particularly detrimental to the fructification of trees.

For peaches, nectarines, &c. a border of 10 or 12 feet wide will generally prove sufficient.

In cases where the soil has been too close and retentive, and the roots apt to grow deep, on the substratum, lay a stratum of six inches of the common soil of the garden, and then form a stratum of about six inches for the roots to run and repose in, composed of two-third parts of fine drift sand (the scrapings of a public road, that has been made or repaired with flints,) and one-third part of rich vegetable mould, well mixed together; and the better way to perform this is, first to lay on about three inches of the composition, and on this place the roots of the plant, and over them spread the other three inches; and cover the whole down with from nine to twelve inches of the common soil of the place.

Where it is not found necessary to form an artificial substratum, it will be sufficient to remove the soil to the depth of fifteen or eighteen inches, and there form the stratum of the roots, covering it down with a foot or nine inches of the common soil.

General mode of planting trees.

The operation of inserting plants in the soil is performed in various ways; the most general mode recommended by Marshal and Nicol is pitting; in which two persons are employed, one to operate on the soil with a spade, and the other to insert the plant, and hold it till the earth is put round it, and then press down the soil with the foot.

The pit having been dug for several months, the surface will therefore be incrusted by the rains or probably covered with weeds. The man first strikes the spade downwards to the bottom 2 or 3 times, in order to loosen the soil, then poaches it, as if mixing mortar for the builder: he next lifts up a spadeful of the earth, or, if necessary, 2 spadesful, so as to make room for all the fibres, without their being anywise crowded together; he then chops the rotten turf remaining in the bottom, and levels the whole. The boy now places the plant perfectly upright, an inch deeper than when it stood in the nursery, and holds it firm in that position. The man *trindles* in the mould gently; the boy gently moves the plant, not from side to side, but upwards and downwards, until the fibres be covered. The man then fills in all the remaining mould; and immediately proceeds to chop and poach the next pit, leaving the boy to set the plant upright, and to tread the mould about it. This, in stiff, wet soil, he does lightly; but in sandy or gravelly soil he continues to tread until the soil no longer retains the impression of his foot. The man has by this time got the pit ready for the next plant, the boy is also ready with it in his hand, and in this manner the operation goes on.

More expeditious method.

The following mode has been practised for many years on the Duke of Montrose's estate in Scotland:—The operator, with his spade, makes 3 cuts, 12 or 15 inches long, crossing each other in the centre, at an angle of 60 degrees, the whole having the form of a star. He inserts his spade across one of the rays, a few inches from the centre, and on the side next himself: then bending the handle towards himself, and almost to the ground, the earth opening in fissures from the centre in the direction of the cuts which had been made, he, at the same instant, inserts his plant at the point where the spade intersected the ray, pushing it forward to the centre, and assisting the roots in rambling through the fissures. He then lets down the earth by removing his spade, having pressed it into a compact state with his heel; the operation is finished by adding a little earth, with the grass side down, completely covering the fissures, for the purpose of retaining the moisture at the root; and likewise as a top-dressing, which greatly encourages the plant to put fresh roots between the swards.

German method of forcing trees.

With a sharp knife make a cut in the bark of the branch which is meant to be forced to bear, and not far from the place where it is connected with the stem, or, if it is a small branch or shoot, near where it is joined to the large bough—the cut is to go round the branch, or to encircle it, and penetrate to the wood. A quarter of an inch from this cut, make a second like the first, round the branch, so that by both encircling the branch, a ring is formed upon the branch, a quarter of an inch broad, between the two cuts. The bark between these two cuts is taken clean away, with a knife, down to the wood, removing even the fine inner bark, which immediately lies upon the wood, so that no connexion whatever remains between the two parts of the bark, but the bare and naked wood appears white and smooth; but this bark ring, to compel the tree to bear, must be made at the time when the buds are strongly swelling or breaking out into blossom. In the same year a callus is formed at the edges of the ring, on both sides, and the connexion of the bark that had been interrupted is restored again, without any detriment to the tree, or the branch operated upon, in which the artificial wound soon again grows over. By this simple (though artificial) means of forcing every fruit-tree with certainty to bear, the most important advantages will be obtained.

To plant small fruits.

Currants and gooseberries are often planted in lines, by the side of the walks or allies of the garden; but it is a better method to plant them in quarters by themselves, and to make new plantations every sixth or seventh year.

☞ Raspberries produce the finest fruit when young; that is, about the third or fourth year after planting, if properly managed.

It is proper to plant some of all the above fruits on a north border, or other shaded situation, in order to prolong the season of them, if that be an object, besides planting them out in quarters, as hinted above.

From four to six feet square, according to the quality of the soil, may be deemed a proper distance at which to plant the above fruits; that is, in good land, six feet; in middling land, five; and in poor land, four feet. Some may also very properly be planted against vacant places on any of the walls, pales, or espaliers. Antwerp raspberries, in particular, and some kinds of gooseberries, are highly improved in size and flavour, if trained to a south wall.

The cranberry is grown to most advantage in bog-earth, kept moist. The margins of ponds are good situations for this plant.

To choose plants.

No better mode exists at present than having recourse for trees to the most reputable nurseries; and, with Mc Phail and Nicol, we would recommend, instead of maiden plants, "to make choice of those not very young, but such as are healthy, and have been transplanted several times, and been in a state of training for two or three years at least." A safe mode is, to plant partly maiden, and partly trained plants, by which means those which come early into fruit, should they prove bad sorts, may be replaced by others.

To manage orchards.

The whole ground of an orchard should be dug in the autumn, and laid up in a rough state for the winter, giving it as much surface as possible in order that the weather may fully act upon and meliorate the soil; thus following it as far as the case will admit. Observe to dig carefully near to the trees, and so as not to hurt their roots and fibres. If the soil be shallow; and if these lie near to the surface, it would be advisable to dig with a fork, instead of the spade.

Crop to within two feet of the trees the first year; a yard the second; four feet the third, and so on, until finally relinquished; which, of course, would be against the eighth year, provided the trees were planted at 30 or 40 feet apart, with early bearing sorts between. By this time, if the kinds have been well chosen, the temporary trees will be in full bearing, and will forthwith defray every necessary expense.

Let a small basin or hollow be made round the stem of each tree, a foot or 18 inches in diameter, and 2 or 3 inches deep, according to the extent of its roots. Fill this basin with littery dung, to the thickness of five or six inches, over which sprinkle a little earth, just enough to keep it from being blown about. This both nourishes the young fibres, and keeps the ground about them moist in hot weather, if wetted freely once a week.

To clothe the stems of standard-trees.

This is done by an envelope of moss, or short grass, or litter wound round with shreds of matting, is of great use the first year after planting, to keep the bark moist, and thereby aid the ascent and circulation of the sap, in the alburnum. This operation should be performed at or soon after planting, and the clothing may be left on till, by decay, it drops off of itself; it is of singular service in very late planting; or when, from unforeseen circumstances, summer-planting becomes requisite.

To prune orchard trees.

The object in pruning young trees, is to form a proper head. The shoots may be pruned in proportion to their lengths, cutting clean away such as cross one another, and fanning the tree out towards the extremities on all sides; thereby keeping it equally poised, and fit to resist the effects of high winds. When it is wished to throw a young tree into a bearing state, which should not be thought of, however, sooner than the third or fourth year after planting, the leading branches should be very little shortened, and the lower or side branches not at all, nor should the knife be used, unless to cut out such shoots as cross one another.

The season for pruning orchards is generally winter or early in spring. A weak tree ought to be pruned directly at the fall of the leaf. To prune in autumn strengthens a plant, and will bring the blossom buds more forward; to cut the wood late in spring tends to check a plant, and is one of the remedies for excessive luxuriance.

To recover deformed trees.

Where a tree is stinted, or the head ill shaped, from being originally badly pruned, or barren from having overborne itself, or from constitutional weakness, the most expeditious remedy is to head down the plant within three, four, or five eyes (or inches, if an old tree) of the top of the stem, in order to furnish it with a new head. The recovery of a languishing tree, if not too old, will be further promoted by taking it up at the same time, and pruning the roots: for as, on the one hand, the depriving of too luxuriant a tree of part even of its sound, healthy roots, will moderate its vigour; so, on the other, to relieve a stinted or sickly tree of cankered or decayed roots, to prune the extremities of sound roots, and especially to shorten the dangling tap-roots of a plant, affected by a bad sub-soil, is, in connexion with heading down, or very short pruning, and the renovation of the soil, and draining, if necessary, of the sub-soil, the most availing remedy that can be tried.

To cure diseases of orchard-trees.

A tree often becomes stinted from an accumulation of moss, which affects the functions of the bark, and renders the tree unfruitful. This evil is to be removed by scraping the stem and branches of old trees with the scraper; and on young trees a hard brush will effect the purpose. Abercrombie and Nicol recommend the finishing of this operation by washing with soap suds, or a medicated wash of some of the different sorts for destroying the eggs of insects.

Wherever the bark is decayed or cracked, it ought to be removed.

The other diseases to which orchard trees are subject are chiefly the canker gum, mildew, and blight, which are rather to be prevented by such culture as will induce a healthy state, than to be remedied by topical applications. Too much lime may bring on the canker, and if so, the replacing a part of such soil with alluvial, or vegetable earth, would be of service.

The gum may be constitutional, arising from offensive matter in the soil, or local, arising from external injury. In the former case, improve the soil; in the latter, employ the knife.

The mildew may be easily subdued at its first appearance, by scattering flour of sulphur upon the infected parts.

For the blight and caterpillars, Forsyth recommends burning of rotton wood, weeds, potatoe-haulm with straw, &c. on the windward side of the trees, when they are in blossom. He also recommends washing the stems and branches of all orchard-trees with a mixture of "fresh cow dung with wine and soapsuds," as a white washer would wash the ceiling or walls of a room. The promised advantages are, the destruction of insects, and fine bark, more especially when it is found necessary to take off all the outer bark.

To preserve apple, cherry, and plumtrees from frost, as practised in Russia.

The severity of the winters at St. Petersburgh is so great that few fruit-trees will survive it, even with careful matting; to prevent the loss which is thus usually sustained, the following mode of training has been attended with complete success. It consists in leading the branches of the trees on horizontal trelises only ten or twelve inches from the ground. When the winter sets in, there are heavy falls of snow, and as the frost increases, the snow generally augments, by which the trees are entirely buried, and receive no injury from the most intense frost.

Another very great advantage of training trees in the above method consists in the growth of the wood, it being of equal strength, and the fruit produced being all alike, the blooms come out much earlier, and the crop ripens sooner. The trees are always clean, and free from insects.

The only cherry that does not succeed in that way is the black heart; this is attributed to the damps which affect the early blossoms, but in a milder climate, this injury would be obviated by placing the trellis higher from the ground. When the trellis decays under the apples, it is never renewed, as the trees keep always (from the strength of their branches) their horizontal position.

There are other advantages of treating fruit-trees in this manner; they come sooner into bearing, and their fruit is not affected by high winds. The apples are never gathered, but suffered to drop off, for the distance they fall is not sufficient to bruise them.

To preserve and pack roots, &c.

Roots, cuttings, grafts, and perennial plants in general, are preserved, till wanted, in earth or moss, moderately moist, and shaded from the sun. The same principle is followed in packing them to be sent to a distance. The roots, or root-ends of the plants, or cuttings, are enveloped in balls of clay or loam, wrapped round with moist moss, and air is admitted to the tops. In this way orange-trees are sent from Genoa to any part of Europe and North America in perfect preservation; and cuttings of plants sent to any distance which can be accomplished in eight months, or even longer with some kinds. Scions of the apple, pear, &c. if enveloped in clay, and wrapt up in moss or straw, and then placed in a portable ice-house, so as to prevent a greater heat than 32 deg. from penetrating to them, would keep for a year, and might thus be sent from England to China. The buds of fruit-trees may be preserved in a vegetating state, and sent to a considerable distance, by reducing the leaf-stalks to a short length, and enclosing the shoot in a double fold of cabbage-leaf, bound close together at each end, and then enclosing the package in a letter. It is of advantage to place the under surface of the cabbage-leaf inwards, by which the enclosed branch is supplied with humidity, that being the perspirating surface of the leaf, the other surface being nearly or wholly impervious to moisture.

Skreen for protecting wall trees.

It consists of 2 deal poles, on which is nailed thin canvass, previously dipped in a tanner's bark pit, to prevent its being mildewed when rolled up wet. At the top, the ends of the polls fit into double iron loops, projecting a few inches from the wall, immediately under the sloping; and at the bottom they are fixed, by a hole at the end of each pole, upon a forked iron coupling, which projects about 14 inches from the wall, thereby giving the skreen a sufficient inclination to clear the branches. When it is wished to uncover the trees, one of the poles is disengaged, and rolled back to the side of the other, where it is fastened as before. The most violent winds have no injurious effect upon shades of this kind; a wall is very expeditiously covered and uncovered, and there is not any danger of damaging the blossoms in using them; they occupy very little space when rolled up, are not liable to be out of order, and, although rather expensive at first, seem to be very durable. From the facility with which the skreen is put up, it may be beneficially used in the seasons when fruit ripens, to secure a succession, by retarding the crop of any particular tree.

The lower ends of the poles are advantageously retained in their place, by means of a small iron spring key, attached to the coupling by a short chain.

To protect fruits from insects.

Some species, as wasps, flies, &c. are prevented from attacking ripe fruits by gauze or nets, or by inclosing the fruit, as grapes, in bags.

The blossom of the hoya carnosa drives wasps from grapes, in hot-houses; and the fruit of the common yew-tree, the same in open air.

To manage pinery.

The culture of Pine apples (says Nicol) is attended with a heavier expense than that of any other fruit under glass: especially if they be grown in lofty stoves: but independent of this, pine-apples may certainly be produced in as great perfection, if not greater, and with infinitely less trouble and risk, in fluid pits, if properly constructed, than in any other way.

The pinery should therefore be detached from the other forcing-houses, and consists of three pits in a range; one for crowns and suckers, one for succession, and one for fruiting plants. The fruiting pit to be placed in the centre, and the other two, right and left, forming a range of 100 feet in length; which would give pine-apples enough for a large family.

The fruiting-pit to be 40 feet long, and 10 wide, over walls; and each of the others to be 30 feet long, and nine feet wide also over walls. The breast-wall of the whole to be on a line, and to be 18 inches above ground. The back-wall of the centre one to be five feet, and of the others, to be 4 1-2 feet higher than the front. The front and end flues to be separated from the bark bed by a three inch cavity, and the back flues to be raised above its level.

The furnaces may either be placed in front, or at the back, according to conveniency; but the strength of the heat should be first exhausted in front, and should return in the back flues. The fruiting-pit would require two small furnaces, in order to diffuse the heat regularly, and keep up a proper temperature in winter; one to be placed at each end; and either to play, first in front, and return in the back; but the flues to be above, and not alongside of one another. The under one to be considered merely as an auxiliary flue, as it would only be wanted occasionally. None of these flues need be more than five or six inches wide, and nine or ten deep. Nor need the furnaces be so large, by a third or a fourth part, as those for large forcing houses; because there should be proper oil-cloth covers for the whole, as guards against severe weather, which would be a great saving of fuel. The depth of the pits should be regulated so as that the average depth of the bark-beds may be a yard below the level of the front flues, as to that level the bark will generally settle, although made as high as their surfaces, when new stirred up. If leaves, or a mixture of leaves with dung, are to be used instead of bark, the pits will require to be a foot, or half a yard deeper.

General mode of cultivating the pine.

The culture of this plant generally commences in a common hot-bed frame, heated by dung; at the end of six or nine months, it is removed to a larger framed hot-bed, or pit, generally called a succession bed; and after remaining here from three to 12 months, it is removed to its final destination, the fruiting-bed. Here it shews its fruit, continues in a growing state during a period of from 6 to 12 months, according to the variety grown, mode of culture, &c. and finally ripens its fruit and dies, leaving the crown or terminal shoot of the fruit, and one or more suckers or side-shoots as successors. The production of a single pine apple, therefore, requires a course of exotic culture, varying from 18 months to 3 years.

Soil.

The pine-apple plant will grow in any sort of rich earth taken from a quarter of the kitchen garden, or in fresh sandy loam taken from a common, long pastured with sheep, &c. If the earth be not of a rich, sandy quality, of darkish colour, it should be mixed well with some perfectly rotton dung and sand, and if a little vegetable mould is put among it, it will do it good, and also a little soot. Though pine-plants will grow in earth of the strongest texture, yet they grow most freely in good sandy loam not of a binding quality.

Heat.

Pines do not require so strong a bottom-heat as many keep them in; yet there is something in a mild tan-heat, so congenial to their natures, that they thrive much better in pots plunged in a bark bed, if properly managed, than when planted out on a bed of earth that is heated, and often scorched, by under flues. The tan or bark-pits are therefore essential to the pinery. Bark-pits are filled with tan which has previously undergone a course of draining and sweating. The heat thus produced, will last from 3 to 6 months, when it is sifted and again put into a state of fermentation, by replacing the deficiency occasioned by decay, and a separation of the dust by sifting with new tan. In this way the bark-bed is obliged to be stirred, turned, refreshed, or even renewed, several times a year, so as to produce and retain at all times a bottom heat of from 75 to 85 degrees in each of the three departments of pine culture.

Propagation of the pine.

The pine is generally propagated by crowns and suckers, though, in common, with every other plant, it may be propagated by seed.

To separate crowns and suckers.

When the fruit is served at table, the crown is to be detached by a gentle twist, and returned to the gardener, if it be wanted for a new plant. Fruit stalk suckers are taken off at the same period. Suckers at the base of the herb are commonly fit for separation when the fruit is mature; though, if the stool be vigorous, they may be left on for a month after the fruit is cut, the stool receiving plentiful waterings on their account. The fitness of a sucker to be removed is indicated, at the lower part of the leaves, by a brownish tint; on the appearance of which, if the lower leaf be broken off, the sucker is easily displanted by the thumb.

If the old fruiting-plant offers only small bottom suckers, or fails to furnish any, good suckers may be thus brought out:—having waited till the fruit is cut, take the old plant in its pot out of the bark-bed: strip off the under leaves near the root, and with the knife cut away the leaves to 6 inches from the bottom. Take out some of the stale mould from the pot, fill up with fresh, and give a little water. Plunge the old plant into a bed with a good growing heat. Let the routine culture not be neglected, and the old plants will soon send out good suckers: allow these to grow till they are 4 inches long, or more; and on the signs of fitness, detach them.

As soon as either crowns or suckers are detached, twist off some of the leaves about the base; the vacancy thus made at the bottom of the stem is to favour the emission of roots. Pare the stump smooth; then lay the intended plants on a shelf in a shaded part of the stove or of any dry apartment. Let crowns and fruit off-sets lie till the part that adhered to the fruit is perfectly healed; and root suckers in the same manner till the part which was united to the old stock is come dry and firm. They will be fit to plant in five or six days.

Treatment of the plants.

Keep the plants growing gently, and have the pots, in general, completely filled with the roots by the time at which it is intended to excite them into blossom. From the middle of February to the 1st of March is a good time to have the main crop in flower; as the prospective season is the finest. About a month before it is expected to see fruit, dress the plants by taking away 2 inches in depth from the top of the mould. Twist off some of the lower leaves. Fill up with fresh compost, round the stem, to the remaining leaves. The bark-bed should be revived at the same time, so as to make it lively: but no new tan should be added, till the time for the fullest heat arrives. If it is desired to ripen eminently large fruit, destroy the suckers as they spring, by twisting out their hearts with an iron sharp pointed instrument formed for the purpose. Apply this to the heart of the sucker; and turning it round, bring the heart away: on the other hand, when the multiplication of the stock is a principal object, the suckers must not be extirpated. A yet further advantage may be given to the swelling of the fruit, by having a few of the lower leaves of the plants taken off, and by putting a rim of tin, or any thing else in the form of a hoop, round the top of the pot, sufficient to raise the mould 3 or 4 inches. The mould should be of the best quality, and constantly kept in a moderate moist state: this may be done by having the surface kept covered with moistened moss. The roots of the pine plant, especially those produced from the part of the stem just under the leaves, will then make a surprising progress, and the fruit will be greatly benefited by this expedient.

To cut ripe pines.

The indications of maturity are, a diffusive fragrance, acccompanied by change in the colour of the fruit; most sorts becoming yellow, or straw colour; others dark-green, or yellowish tinged with green. Cut pine-apples before they are dead-ripe, or the spirit of the flavour will be dissipated. Bring away with the fruit about 5 inches of stalk, and leave the crown adhering to the top. If pine-apples be not cut soon after they begin to colour, they fall greatly off in flavour and richness, and that sharp luscious taste so much admired, becomes insipid.

To destroy insects in pines.

If the plants by proper culture be kept healthy and vigorous, insects will not annoy, but leave them. The coccus hesperides seems to delight in disease and decay, as flies do in carrion. The following recipe may safely be applied to pine-plants in any state, but certainly, best to crowns and suckers, at striking them in August: to others it may, at any rate, be used in the March shifting, when they are shaken out of their pots.

Take of soft soap, 1 pound; flowers of sulphur, 1 pound; tobacco, half a pound; nux vomica, 1 oz.; soft water, 4 gallons; boil all these together till the liquor is reduced to 3 gallons, and set it aside to cool. In this liquor immerse the whole plant, after the roots and leaves are trimmed for potting. Plants in any other state, placed in the bark-bed, may safely be watered over head with the liquor reduced in strength by the addition of a third part of water. As the bug harbours most in the angles of the leaves, there is the better chance that the medicated water will be effectual, because it will there remain the longest, and there its sediment will settle. The above is a remedy for every species of the coccus; and for most insects, on account of its strength and glutinous nature. Its application will make the plants look dirty; therefore, as soon as the intended effect may be supposed to have followed, whatever remains of the liquor on the leaves should be washed off with clean water. It would be improper to pour a decoction charged with such offensive materials over fruiting plants.

Other methods.

Turn the plants out of the pots, and clean the roots; then keep them immersed for 24 hours in water in which tobacco stalks have been infused: the bugs are then to be rubbed off with a sponge, and plants, after being washed in clean water and dipped, are to be repotted.

In the "Caledonian Horticultural Transactions," a similar mode is described, only in the place of tobacco-juice, flowers of sulphur are directed to be mixed with the water. With a bit of bass-mat fixed on a small stick, and dipt in water, displace as many of the insects as can be seen. Then immerse the plants in a tub of water, containing about 1 lb. of flowers of sulphur to each garden potful. Let them remain covered in the water 24 hours, then lay them with their tops downward to dry; and re-pot them in the usual manner.

The experience of Hay, one of the best practical gardeners in Scotland, leads him to conclude, that even moderate moisture is destructive to these insects. For many years, he regularly watered his pine plants over head with the squirt, during the summer-months: this was done only in the evening: it never injured the plants; and the bug never appeared upon them.

To plant vines.

Vines are commonly either trained against the back wall, or on a trellis under the glass roof. In the former case, the plants are always placed inside the house: but in the latter, there are two opinions among practical men, one in favour of planting them outside, and the other inside the parapet wall.

Abercrombie says, "Let them be carefully turned out of the pots, reducing the balls a little, and singling out the matted roots. Then place them in the pits, just as deep in the earth as they were before, carefully spreading out the fibres, and filling in with fine sifted earth, or with vegetable mould. Settle all with a little water; and let them have plenty of free air every day, defending them from very severe frost or much wet; which is all the care they will require till they begin to push young shoots."

Composts for vines.

The following are the materials and proportions of a good compost, recommended by Abercrombie:—Of top-spit sandy loam, from an upland pasture, one-third part; unexhausted brown loam from a garden, one-fourth part; scrapings of roads, free from clay, and repaired with gravel or slate, one-sixth part; vegetable mould, or old tan reduced to earth, or rotten stable dung, one-eighth part; shell marl or mild lime, one-twelfth part. The borders to be from 3 to 5 feet in depth, and, where practicable, not less than 4 feet wide in surface within the house, communicating with a border outside the building, of not less than ten feet wide.

To choose the plants.

Vines are to be had in the nurseries, propagated either from layers, cuttings, or eyes; and provided the plants be well rooted, and the wood ripe, it is a matter of indifference from which class the choice is made.

Speedy mode of storing a new grape house.

This mode is only to be adopted where a vinery previously exists in the garden, or where there is a friend's vinery in the neighbourhood.

In the end of June or beginning of July, when the vines have made new shoots from 10 to 12 feet long, and about the time of the fruit setting, select any supernumerary shoots, and loosening them from the trellis, bend them down so as to make them form a double or flexure in a pot filled with earth, generally a mixture of loam and vegetable mould; taking care to make a portion of last year's wood, containing a joint, pass into the soil in the pot. The earth is kept in a wet state: and at the same time, a moist warm air is maintained in the house. In about ten days, roots are found to have proceeded plentifully from the joint of last year's wood, and these may be seen by merely stirring the surface of the earth; or sometimes they may be observed penetrating to its surface. The layer may now be safely detached, very frequently it contains one or two bunches of grapes, which continue to grow and come to perfection. A layer cut off in the beginning of July, generally attains, by the end of October, the length of 15 or 20 feet. A new grape-house, therefore, might in this way be as completely furnished with plants in three months, as by the usual method, above described, in three years.

Another mode.

A mode of more general utility than the foregoing, is to select the plants in the nursery a year before wanted, and to order them to be potted into very large pots, baskets, or tubs, filled with the richest earth, and plunged into a tan bed. They will thus make shoots, which, the first year after removal to their final destination, will, under ordinary circumstances, produce fruit.

To prune and train vines.

The methods of pruning established vines admit of much diversity, as the plants are in different situations. Without reckoning the cutting down of young or weak plants alternately, to the lowermost summer shoot, which is but a temporary course, three different systems of pruning are adopted.

The first is applicable only to vines out of doors; but it may be transferred to plants in a vinery, without any capital alteration. In this method, one perpendicular leader is trained from the stem, at the side of which, to the right and left, the ramifications spring. Soon after the growing season has commenced, such rising shoots as are either in fruit and fit to be retained, or are eligibly placed for mother-bearers next season, are laid in, either horizontally, or with a slight diagonal rise, at something less than a foot distance, measuring from one bearing shoot to the next: the rising shoots intended to form young wood, should be taken as near the origin of the branch as a good one offers, to allow of cutting away, beyond the adopted lateral, a greater quantity of the branch, as it becomes old wood; the new-sprung laterals, not wanted for one of these two objects, are pinched off. The treatment of those retained, during the rest of the summer, thus differs:—As the shoots in bearing extend in growth, they are kept stopped about two eyes beyond the fruit:—the coronate shoots, cultivated merely to enlarge the provision of wood, are divested of embryo bunches, if they show any; but are trained at full length as they advance during the summer, until they reach the allotted bounds. In the winter-pruning, there will thus be a good choice of mother bearers. That nearest the origin of the former is retained, and the others on the same branch are cut away: the rest of the branch is also taken off, so that the old wood may terminate with the adopted lateral: the adopted shoot is then shortened to two, three, four, or more eyes, according to its place on the vine, its own strength, or the strength of the vine. The lower shoots are pruned in the shortest, in order to keep the means of always supplying young wood at the bottom of the tree.

Second method.

The second method is to head the natural leader, so as to cause it to throw out two, three, or more principal shoots; these are trained as leading branches; and in the winter-pruning are not reduced, unless to shape them to the limits of the house, or unless the plant appears too weak to sustain them at length. Laterals from these are cultivated about twelve inches apart, as mother-bearers; those in fruit are stopped in summer, and after the fall of the leaf are cut into one or two eyes. From the appearance of the mother-bearers, thus shortened, this is called spur-pruning.

Third method.

The third plan seems to flow from taking the second as a foundation, in having more than one aspiring leader; and from joining the superstructure of the first system immediately to this, in reserving well-placed shoots to come in as bearing wood. Thus, supposing a stem, which has been headed, to send up four vigorous competing leaders, two are suffered to bear fruit, and two are divested of such buds as break into clusters, and trained to the length of 10, 12, 15 feet, or more, for mother-bearers, which have borne a crop, are cut down to within two eyes of the stool or legs, according to the strength of the plant; while the reserved shoots lose no more of their tops than is necessary to adjust them to the trellis.

To prune vines to advantage.

In pruning vines, leave some new branches every year, and take away (if too many) some of the old, which will be of great advantage to the tree, and much increase the quantity of fruit. When you trim your vine, leave two knots, and cut them off the next time; for usually the two buds yield a bunch of grapes. Vines, thus pruned, have been known to bear abundantly, whereas others that have been cut close to please the eye, have been almost barren of fruit.

To mature grapes by incision of the vine bark.

It is not of much consequence in what part of the tree the incision is made; but in case the trunk is very large, the circles ought to be made in the smaller branches. All shoots which come out from the root of the vine, or from the front of the trunk, situated below the incision, must be removed as often as they appear, unless bearing wood is particularly wanted to fill up the lower part of the wall, in which case one or two shoots may be left.

Vines growing in forcing houses are equally improved in point of size and flower, as well as made to ripen earlier, by taking away circles of bark. The time for doing this, is when the fruit is set, and the berries are about the size of small shot. The removed circles may here be made wider than on vines growing in the open air, as the bark is sooner renewed in forcing houses, owing to the warmth and moisture in those places. Half an inch will not be too great a width to take off in a circle from a vigorous growing vine; but I do not recommend the operation to be performed at all in weak trees.

This practice may be extended to other fruits, so as to hasten their maturity, especially figs in which there is a most abundant flow of returning sap; and it demonstrates to us, why old trees are more disposed to bear fruit than young ones. Miller informs us, that vineyards in Italy are thought to improve every year by age, till they are fifty years old. For as trees become old, the returning vessels do not convey the sap into the roots with the same facility they did when young. Thus, by occasionally removing circles of bark, we only anticipate the process of nature. In both cases, a stagnation of the true sap is obtained in the fruiting branches, and the redundant nutriment then passes into the fruit.

It often happens after the circle of bark has been removed, a small portion of the inner bark adheres to the alburnum. It is of the utmost importance to remove this, though ever so small, otherwise, in a very short space of time, the communication is again established with the roots, and little or no effect produced. Therefore in about ten days after the first operation has been performed, look at the part from whence the bark was removed, and separate any small portion which may have escaped the knife the first time.

To prevent the dropping off of grapes.

Make a circular incision in the wood, cutting away a ring of the bark, about the length of 2 millimetres. The wood acquires a greater size about the incision, and the operation accelerates the maturity of the wood, and that of the fruit likewise. The incision should not be made too deep, and further than the bark, or it will spoil both in the wood and the fruit.

To retard the sap.

At certain periods, preventing or retarding the mounting of the sap, tends to produce and ripen the fruit. An abundance of sap is found to increase the leaf buds and decrease the flower buds. A process to retard sap has long been employed in the gardens of Montreuil. The practice is to divaricate the sap as near the root as may be, by cutting off the main stem, and training two lateral branches, from which his wall is to be filled.—Another process of interrupting the rising of the sap, by separating the bark, has been long in practice in vine forcing-houses; this is done when the grapes are full grown, and is found to assist the bark in diminishing the aqueous, and increasing the saccharine, juice.

To destroy insects in vines.

The red spider is the grand enemy to the vinery; after every winter's pruning and removal of the outward rind on the old wood, anoint the branches, shoots and trellis, with the following composition, the object of which is the destruction of their eggs or larvæ:—

Soft soap, 2 lbs. flour of sulphur, 2 lbs. leaf of roll tobacco, 2 lbs. nux vomica. 4 oz. turpentine, 1 English gill.

Boil the above in 8 English gallons of soft river water, till it is reduced to six.

Lay on this composition, milk warm, with a painter's brush: then with a sponge carefully anoint every branch, shoot, and bud; being sure to rub it well into every joint, hole, and angle. If the house is much infected, the walls, flues, rafters, &c. are also to be painted over with the same liquor. Watering over the leaves and fruit at all times, except the ripening season, is the preventive recommended, and which all gardeners approve.

To protect grapes from wasps.

Plant near the grapes some yew-trees, and the wasps will so far prefer the yew-tree berries, as wholly to neglect the grapes.

To take off superfluous suckers from shrubs.

Many flowering shrubs put out strong suckers from the root, such as lylacs, syringa, and some of the kinds of roses, which take greatly from the strength of the mother plant, and which, if not wanted for the purpose of planting the following season, should be twisted off, or otherwise destroyed.

To renovate old apple trees.

Take fresh made lime from the kiln, slack it well with water, and well dress the tree with a brush, and the insects and moss will be completely destroyed, the outer rind fall off, and a new, smooth, clear, healthy one formed, and the tree assumes a most healthy appearance and produces the finest fruit.

Treatment of apple trees.

The limbs of apple trees are recommended by some to be brushed all over in the midst of summer: but it is difficult to brush the branches of trees when the fruit is upon them. Instead of brushing the trees in summer, as soon as the leaves have fallen, every tree should be carefully and freely pruned, this will open a passage to the sun and air, and will contribute to health in the future season. In addition to this, says a correspondent of the Monthly Magazine for 1820, I should recommend brushing off the moss and cutting out the cankered parts, at any season this is convenient, and I further recommend the tree to be anointed some feet from the ground with a composition of sulphur and goose oil, and unless the orchard is ploughed, which is very much the case in Shropshire and Herefordshire, the soil should be opened at the roots.

To render new pippins productive.

To render it more hardy, the farina of the pippin should be introduced to the flower of the Siberian crab, whereby a mule is produced, which ripens in cold and exposed situations, yet retains the rich flavour of the other parent. But these hybrid, or mule productions, in a few generations return to the character of the one or the other variety. A most excellent variety of this apple, called the Downton pippin, has been obtained by introducing the farina of the golden to the female flower of the orange pippin, and the progeny is more hardy than either parent.

To obtain early fruit by exhibiting the trees.

Mr. Knight, having trained the branches of an apple tree against a southern wall, he in winter loosened them to their utmost, and in spring, when the flower-buds begin to appear, the branches were again trained to the wall. The blossoms soon expanded, and produced fruit, which early attained perfect maturity; and what is more, the seeds from their fruits afforded plants, which, partaking of the quality of the parent, ripened their fruit very considerably earlier than other trees raised at the same time from seeds of the same fruit, which had grown in the orchard.

To hasten the ripening of wall-fruit.

Painting the wall with black paint, or laying a composition of the same colour, produces not only more in quantity, in the proportion of five to three, but the quality is also superior in size and flavour to that which grows against the walls of the natural colour. But the trees must be clear of insects, or they will thrive, from the same cause, more than the fruit.

To preserve plants from frost.

Before the plant has been exposed to the sun, or thawed, after a night's frost, sprinkle it well with spring-water, in which sal-ammoniac or common salt has been infused.

To engraft the coffee tree.

Plant in small hampers, during the rainy season, young plants raised by seed, when they are from 12 to 18 inches high. Place them in the shade, until they are quite recovered, then remove them in the hampers, respectively, to the foot of the coffee trees chosen for the mother plants, which ought to be of the most healthy and productive kind.

These latter should be cut down to within 3 or 4 inches of the ground, to make them throw out new wood near their roots. It is those shoots which are grafted, when they are about a foot or 15 inches long, upon the seedling plants in the hampers placed round the mother plants. The hampers should be in part buried in the ground, to preserve the earth within them moist.

There are several ways of performing the operation of grafting; but we shall give only the two following, which seem most likely to answer the purpose, without calling upon the cultivator to pursue too complex a process:—

1st. Draw together the stem of the plant in the hamper, and one of the branches of the mother plant. Then make a longitudinal incision on each of them, of the same length: bring the two incisions together, so that one wound covers the other; bind them firmly together, and finally cover them with a mixture of clayey earth and cow dung. It would be useful to cut off the top of the plant in the hamper, in order to force the sap into the branch of the mother plant.

2d. Draw together the tree in the hamper and the branch of the mother plant, as before; and take off from 3 to 8 inches of the head of the former. Then make a triangular incision upon this cut, and a similar one on the branch of the mother plant, to unite the two wounds; make them fast together, and cover them with the same composition as before; then place the branch upright by means of a prop. When the parts are firmly knit together, cut the branch away from the mother plant, and the engrafting is completed.

Young trees, thus engrafted, after remaining one or two years in the nursery, should be removed to the plantation they are designed for. This method is highly useful to the fruit trees which do not propagate, with all their best qualities, by means of seed. In the same manner, excellent varieties of spice trees may be raised from plants propagated by seed.

To preserve fruit trees in blossom from frost.

Surround the trunk of the tree in blossom with a wisp of straw or hemp. The end of this sink by means of a stone tied to it, in a vessel of spring water at a little distance from the tree. One vessel will conveniently serve two trees. Or the cord may be lengthened so as to surround several before its end is plunged into the water. It is necessary that the vessel should be placed in an open situation out of the reach of any shade, so that the frost may produce all its effects on the water by means of the cord communicating with it.

Chinese mode of propagating fruit trees.

Strip a ring of bark, about an inch in width, from a bearing branch, surround the place with a ball of fat earth, or loam, bound fast to the branch with a piece of matting: over this they suspend a pot or horn, with water, having a small hole in the bottom just sufficient to let the water drop, in order to keep the earth constantly moist. The branch throws new roots into the earth just above the place where the ring of bark was stripped off. The operation is performed in the spring, and the branch is sawn off and put into the ground at the fall of the leaf. The following year it will bear fruit.

To heal wounds in trees.

This method consists in making a varnish of common linseed oil, rendered very drying, by boiling it for the space of an hour, with an ounce of litharge to each pound of oil, mixed with calcined bones, pulverized and sifted, to the consistence of an almost liquid paste. With this paste the wounds are to be covered, by means of a brush, after the bark and other substance have been pared, so as to render the whole as smooth and even as possible. The varnish must be applied in dry weather, in order that it may attach itself properly.

Composition for healing wounds in trees.

Take of dry pounded chalk, 3 measures; and of common vegetable tar, 1 measure; mix them thoroughly, and boil them, with a low heat, till the composition becomes of the consistency of bees-wax; it may be preserved for use in this state for any length of time. If chalk cannot conveniently be got, dry brick-dust may be substituted. After the broken or decayed limb has been sawed off, the whole of the saw cut must be very carefully pared away, and the rough edges of the bark, in particular, must be made quite smooth: the doing of this properly is of great consequence; then lay on the above composition, hot, about the thickness of half-a-crown, over the wounded place, and over the edges of the surrounding bark; it should be spread with a hot trowel.

To propagate herbs by slips and cuttings.

Many kinds of pot-herbs may, in July, be propagated by cuttings or slips, which may be planted out to nurse on a shady border for a few weeks, or till thay have struck root, and may then be planted out where they are to remain. If made about the middle, or end of the month, they will be ready for transplanting before the end of August, and in that case will be well established before the winter. The kinds are marjoram, mint, sage, sorrel, tansy, tarragons, and thyme.

To prevent the growth of weeds round your fruit trees.

To diminish the growth of weeds round fruit trees, spread on the ground round the fresh transplanted trees, as far as the roots extend, the refuse stalks of flax after the fibrous parts have been separated. This gives them very surprising vigour, as no weeds will grow under flax refuse, and the earth remains fresh and loose. Old trees treated in the same manner, when drooping in an orchard, will recover, and push out vegerian shoots. In place of flax stalks, the leaves which fall from trees in autumn may be substituted, but they must be covered with waste twigs, or any thing else that can prevent the wind from blowing them away.

To avoid the bad effects of iron nails, &c. on fruit trees.

It often happens that some of the limbs of fruit trees, trained against a wall, are blighted, and die, while others remain in a healthy and flourishing state. This has hitherto been erroneously attributed to the effects of lightning; but from closer observation, and from several experiments, it has been found to arise from the corroding effects of the nails and cramps with which trees in this situation are fastened. To avoid this inconvenience, therefore, it requires only to be careful in preventing the iron from coming in contact with the bark of the trees.

To destroy moss on trees.

Remove it with a hard scrubbing brush in February and March, and wash the trees with cow dung, urine, and soap-suds.

To protect trees and shrubs from the attack of hares.

Take three pints of melted tallow to one of tar, and mix them well together, over a gentle fire. In November, take a small brush, and go over the rind or bark of the trees with a mixture, in a milk warm state, as thin as it can be laid on with the brush. This coating will not hinder the juices or sap expanding, in the smallest degree. Its efficacy has been proved, by applying the liquid to one tree and missing another, when the latter has been attacked, and the former left. During five years' experience, of the besmeared, the first two years, not one was injured afterwards. If all the bark were properly gone over with the mixture, they, probably, would not need any more for some years.

To prevent the propagation of insects on apple trees.

Let a hard shoe brush be applied to every infected limb, as if it were to coach harness, to get off the dirt, after which, with the tin box and brush, give the limbs a dressing, leaving them exposed to the sun, to inhale the efficacy of the application. This should be repeated occasionally during the summer, choosing always a dry time, and warm clear sunshine.

To prevent the ravages of the gooseberry caterpillar.

The only remedy is by placing something about the stem, or among the branches of the bush, the smell of which is obnoxious to flies, and which they will not approach; the smell of coal-tar is said to keep off the caterpillars; the fact is, that it kept off the fly. The practice is to wrap a beam or twist of seed, strongly impregnated with this strong-scented bitumen, round the stem of the bush: and no caterpillar will touch a leaf.

Other remedies are used, such as soap suds thrown over the bushes, lime chimney-soot, and a strong decoction of elder-leaves; but who can eat gooseberries and currants after they have been besmeared with such filthy materials? keeping off the fly by the smell of something which is disagreeable to it, goes to the root of the evil at once; and there is nothing in the smell of coal-tar which can excite a prejudice in the most delicate stomach.

Another method.

A few small pits or holes, from 12 to 15 inches deep, being dug among the bushes, at convenient distances, all the surface mould immediately under and near to the bushes, wherein the greatest quantity of shells is likely to be deposited, is taken off with a common garden hoe, and buried in these holes or pits; after which the whole surface is carefully dug over, to a considerable depth. Wherever these operations are properly performed, no apprehension of loss from this kind of caterpillar need be entertained.

To cure the disease in apple trees.

Brush off the white down, clear off the red stain underneath it, and anoint the places infected with a liquid mixture of train oil and Scotch snuff.

Another method.

Orchards are occasionally much injured by an insect appearing like a white efflorescence; when bruised between the fingers it emits a blood red fluid. Mix a quantity of cow-dung with human urine, to the consistence of paint, and let the infected trees be anointed with it, about the beginning of March.

To cure the canker in apple trees.

The only means of preventing the canker worm, which destroys the young fruit, and endangers the life of the tree, when discovered, and which in many instances has proved to to be effectual, was encircling the tree, about knee high, with a streak of tar, early in the spring, and occasionally adding a fresh coat.

In other trees.

Cut them off to the quick, and apply a piece of sound bark from any other tree, and bind it on with a flannel roller. Cut off the canker, and a new shoot will grow strong, but in a year or two you will find it cankered.

To cure ulcers in elm trees.

The remedy consists in boring every tree attacked by the disease, at the ulcer itself; and in applying a tube in the hole, occasioned by the borer, penetrating about 9 lines in depth. The sound trees, which are also bored, afford no liquor, whereas those that are ulcerated afford it in great abundance, increasing particularly in fine weather, and when the wound is exposed to the south. Stormy weather, and great winds, stop the affusion. In this manner the ulcers dry and heal in 48 hours.

To cleanse orchard trees by lime.

The use of lime has been highly recommended in the dressing of old moss-eaten orchard trees. Some fresh made lime being slaked with water, and some old worn out apple-trees well dressed with it with a brush, the result was, that the insects and moss were destroyed, the outer rind fell off, and a new, smooth, clear healthy one formed; the trees, although 20 years old, assumed a most healthy appearance.

To cure blight in fruit trees.

A smothering straw-fire should be made early in October, in calm weather, under each tree, and kept up during an hour or more. This done, scrape the moss and other impurities from the trunk, and from every obscure hole and corner; set your ladders to the branches, carefully cleaning them in the same way, taking from the remaining leaves every web, or nidus, of insects. If need be, wash the trunk, and all the larger wood, with a solution of lime and dung. Last of all, it is necessary to destroy the insects, or eggs, which may have dropped upon the ground, and may be useful to loosen the soil in the circumference. In the spring, or early blighting season, apply your ladders, make a careful survey of every degree, and act in consequence; repeat this monthly, picking off all blights by hand, and using the water engine where ablution may be necessary. To those who have fruit, or the market profit, thereof, every orchard or garden, little or great, will amply repay such trouble and expense.

Another method.

Trees newly transplanted, in general, escape its attacks, when other trees, of the same kind of fruit, grown in the same situation, have been nearly destroyed. Peach and nectarine trees should be dug up, once in every five or six years, and replanted with fresh mould. By this method, a larger quantity of fruit, of a superior kind, will be obtained. The covering of trees with mats, by almost totally depriving them of light, has a tendency to create blight, which often attends an excess of heat or cold.

To preserve apple trees from blight.

By washing the branches with quick lime it will preserve the trees from blight, and ensure a crop: those which escaped washing suffered from the blight, whilst the others produced a good crop.

To prevent the blight or mildew from injuring orchards.

Rub tar well into the bark of the apple trees about four or six inches wide round each tree, and at about one foot from the ground. This effectually prevents blight, and abundant crops are the consequence.

To prevent mildew on fruit trees.

Take one quart of watky, (a Russian spirit prepared from the distillation of rye, and resembling in every respect the whiskey of Scotland,) two pounds of powdered sulphur; two ounces of copperas, and a small quantity of camphor. Dissolve first the camphor, reduced to powder, gradually in the spirit, then dissolve also the copperas in it; then rub in gradually the powdered sulphur into the solution, when the whole will form a mixture of a thickish consistence. The fruit trees, in the spring of the year, immediately after being cleaned and tied up, are to have their trunks and all their branches completely covered with this mixture, by means of a large painter's brush.

To prevent mildew on peach trees.

In the months of January and February, if the trees are in a stunted or sickly state, take away all the old mould from the roots as carefully as possible, and put in its place fresh rotten turf from an old pasture, without any dung; and the trees will not only recover their health, but produce a crop of fine swelled fruit.

To prevent gumming in fruit trees.

To prevent gumming, or the spontaneous exudation of gum from the trunks of fruit trees, which injures to a considerable extent, the growth and strength of the tree.

Take of horse dung any quantity, mix it well up with a quantity of clay and a little sand, so as to make a composition; then add a quantity of pitch tar, (what is put upon cart wheels,) and form a wettish composition of the whole. The fruit trees, in the spring of the year, after they are cleaned and tied up, are to have their trunks and stems completely bedaubed or covered with this mixture.

To cultivate the cucumber.

To produce cucumbers at an early season, is an object of emulation with every gardener; and there is scarcely any person, who has not his cucumber-bed in his garden. Cucumbers are forced in hot beds, pits, and hot-houses, and the heat of fire, steam, and dung, have been applied to their culture; but dung is the only thing yet found out, by the heat of which the cucumber may be advantageously cultivated.

Soil.

Cucumbers, like every other plant, will grow in any soil, though not with the same degree of vigour, provided they be supplied with a sufficiency of heat, light, water, and air.

For early forcing.

Abercrombie recommends a mould or compost of the following materials;—One-third of rich top-spit earth, from an upland pasture, one half of vegetable mould, and one-sixth of well decomposed horse dung, with a small quantity of sand.

Mc Phail used vegetable mould, made from a mixture of the leaves of elm, lime, beech, sycamore, horse and sweet chesnut, spruce and Scotch fir, walnut, laurel, oak, evergreen, oat, ash, &c. and among them, withered grass, and weeds of various sorts. This vegetable mould is preferable to any other.

Compost used in Kew garden.

Of light loam, a few months from the common, one-third part; the best rotten dung, one-third part, leaf mould, and heath earth, equal parts, making together one-third part; the whole well mixed for use.—*Horticult. Trans. Vol.* 2.

To form the seed.

If one light frame will be large enough for ordinary purposes, choose a dry sheltered part of the melon ground, and form a bed. When high winds are suffered to blow against a cucumber bed, they have a very powerful effect on it, therefore, when a cucumber bed is about to be formed, the first object of consideration should be, to have it sheltered from the high winds and boisterous stormy weather. Having put on the frame, and waited till the bed is fit for moulding, lay in 5 or 6 inches depth of the proper earth or compost.

Sowing.

Abercrombie sows some seeds in the layer of the earth, which he spreads over the bed, putting them in half an inch deep. He also sows some seeds in two, three, or more small pots of the same kind of earth, which may be plunged a little into that of the bed.

To raise plants from cuttings.

Instead of raising cucumber plants from seed, they may be raised from cuttings, and thus kept on from year to year, in the following manner:—take a shoot which is ready for stopping, cut it off below the joint, then cut smooth the lower end of the shoot or cutting, and stick it into fine leaf or other rich mould, about an inch deep, and give it plenty of heat, and shade it from the rays of the sun till it be fairly struck. By this method cucumber plants may readily be propagated.

Treatment till removed to the fruiting bed.

After sowing, continue the glasses on the frame; giving occasional vent above for the steam to evaporate. The plants will be up in a few days, when it will be proper to admit air daily, but more guardedly, at the upper ends of the lights. In frosty weather, hang part of a mat over the aperture. When the plants are a little advanced, with the seed leaves about half an inch broad, take them up, and prick some in small pots of light earth, previously warmed by the heat of the bed. Put three plants in each pot, and insert them a little slopingly, quite to the seed-leaves. Plunge the pots into the earth; and prick some plants also into the earth of the bed. Give a very little water just to the roots; the water should be previously warmed to the temperature of the bed. Draw on the glasses; but admit air daily, to promote the growth of the plants, as well as give vent to the steam rising in the bed, by tilting the lights behind, from half an inch to an inch or two high, in proportion to the heat of the bed, and the temperature of the weather. Cover the glasses every night with garden mats, and remove them timely in the morning. Give twice a week, once in two days, or daily, according to the season, a very light watering. Keep up a moderate lively heat in the bed, by requisite linings of hot dung to the sides.—*Abercrombie.*

To guard the seeds from mice.

Lay a pane of glass over the pot or pan till they have come up, and afterwards, at night, cover with a pot of equal size, till the seed-leaves have expanded, and the husks have dropped; for until then, the plants are liable to be destroyed. The cover, however, should always be removed by sun-rise, and be replaced in the evening. It is at night these vermin generally commit their depredations. No air need be admitted till the heat begins to rise, and steam begins to appear; but after that, the light should be tilted a little every day, in whatever state the weather may be, until the plants break ground. Air must then be admitted with more care; and if frosty, or very chill, the end of a mat should be hung over the opening, that the air may sift through it, and not immediately strike the plants.

To transplant cucumbers.

As soon as the seed-leaves of the plants are fully expanded, transplant them singly into pots of the 48th size, and give a little water and air night and day. The temperature for seedlings is from 65 to 75 degrees. With this heat and water, as the earth in the pots becomes dry, and a little air night and day, so as to keep the internal air in the frame sweet and fluctuating between the degrees of heat above-mentioned, the plant will be fit for finally transplanting out in one month, that is, by the 14th of November, into the fruiting frames.—*Horticult. Trans. Vol.* 3.

To form the fruiting bed.

Begin to make preparations for the fruiting bed, about three weeks before the plants are ready to be planted out for good. The dung collected, after being well worked, is made up into a bed of about 4 or 5 feet high, and the frames and lights set upon it. It is afterwards suffered to stand for a few days, to settle, and until its violent heat be somewhat abated, and when it is thought to be in a fit state for the plants to grow in, its surface is made level, and a hill of mould laid in just under the middle of each light, and when the mould gets warm, the plants are ridged out in it. After this, if the bed has become perfectly sweet, and there be heat enough in it, and the weather proves fine, the plants will grow finely.

To plant out.

When the temperature is ascertained to be right, bring the plants in their pots; turn over the hills of mould, forming them again properly, and then proceed to planting. Turn those in pots clean out, one at a time, with the ball of earth whole about the roots; and thus insert one patch of three plants which have grown together, with the ball of earth entire, into the middle of each hill, earthing them neatly round the stems. Also any not in pots, having been pricked into the earth of the bed, if required for planting, may be taken up with a small ball of earth, and planted similarly. With water warmed to the air of the bed, give a very light watering about the roots, and shut down the glasses till next morning. Shade the plants a little from the mid-day sun a few days, till they have taken root in the hills, and cover the glasses every evening with large mats, which should be taken off in the morning.

Mc Phail's method of covering the frames.

First, lay clean single mats on the lights, in length and breadth, nearly to cover the sashes, taking care not to suffer any part of the mats to hang over the sashes on or above the linings, for that would be the means of drawing the steam into the frames in the night time. On these mats spread equally a covering of soft hay, and on the hay lay another covering of single mats, upon which are laid two, and sometimes three or four, rows of boards, to prevent the covering from being blown off by the winds. The mats laid on next to the glass are merely to keep the seeds and dust which may happen to be in the hay from getting into the frames among the plants. If the bed be high, in covering up, steps or short ladders must be used by those whose office it is to cover and uncover; and great care must be taken not to break or injure the glass.

Setting the fruit.

Th cucumber bears male and female blossoms distinctly on the same plant. The latter only produce the fruit, which appears first in miniature close under the case, even before the flower expands There is never any in the males; but these are placed in the vicinity of the females, and are absolutely necessary, by the dispersion of their farina, to impregnate the female blossom; the fruit of which will not, otherwise, swell to its full size, and the seeds will be abortive. The early plants under the glass, not having the full current of the natural air, nor the assistance of bees and other winged insects to convey the farina, the artificial aid of the cultivator is necessary to effect the impregnation.

At the time of fructification, watch the plants daily; and as soon as a female flower and some male blossoms are fully expanded, proceed to set the fruit the same day. Take off a male blossom, detaching it with part of the foot-stalk; hold this between the finger and thumb; pull away the flower leaf close to the stamens and central part, which apply close to the stigma of the female flower, twirling it a little about, to discharge thereon some particles of the fertilizing powder. Proceed thus, to set every fruit, as the flowers of both sorts open, while of a lively full expansion; and generally perform it in the early part of the day, using a fresh male, if possible, for each impregnation, as the males are usually more abundant than the female blossoms. In consequence, the young fruit will soon be observed to swell freely. Cucumbers attain the proper size for gathering in about 15 or 20 days from the time of setting; and often, in succession, for two or three months or more, in the same bed, by good culture. The above artificial operation will be found both necessary and effectual in forcing the cucumber, between the decline of autumn and May, while the plants are mostly shut under glass. In plants more fully exposed to the free air, the impregnation is effected mostly or wholly by nature.

To save the seed.

Select some best summer fruit, from good productive plants; which permit to continue in full growth till they become yellow. Then cut them from the vine, and place them upright on end, in the full sun, for two or three weeks; when they may be cut open, and the seed being washed out from the pulp, spread it to dry and harden; then put it up in papers or bags for future sowing. It will remain good for many years; and seed of three or four years' keeping is preferable for early frame crops.

Insects and diseases.

The thrips sometimes attacks early cucumbers, and is to be destroyed by fumigation. The red spider rarely makes its appearance; when he does, water must have been improperly withheld. Some soils produce canker in the shoots, especially where they branch from the main stem. When this is the case, the only resource is to renew the soil and the plants.

To grow cucumbers under hand glasses.

The following method is given by Mc Phail as that generally practised:—The seeds are sown about the middle of April in a cucumber or melon bed, and when they come up they are potted out into small pots, two or three plants in each, and kept properly watered, and stopped at the first or second joint. About the middle of May, a warm situation, where the mould is very rich, is pitched on, and a trench dug out about 2 feet deep, 3 broad, and the length proportioned according to the number of lights it is intended for. This breach is filled with good warm dung, and when the dung is come to its full heat, it is covered over with 8, 10, or 12 inches deep of rich mould. The glasses are then set upon it about 3 feet distant from each other, and when the mould gets warm under them, the plants are turned out of the pots, with their balls whole, and plunged in the mould under the glasses, and little water given them to settle the mould about their roots, the glasses set over them, and after they have made roots, and begin to grow, in five days they are raised a little on one side to let the plants have free air; and, as the weather gets warmer, air is given more plentifully, to harden the plants, so that they may be able to bear the open air, and run from under the glasses. When the plants begin to fill the glasses, they are trained out horizontally, and the glasses set upon bricks to bear them from the plants. After this the plants require nothing more than to be supplied with water when the summer showers are not sufficient, and to stop them when they run too thin of branches, and thin them of leaves or branches when they are likely to become over crowded.

In warm summers, and in warm situations, by this mode of management, the plants will bear plentifully for about two months, provided they be not attacked by insects or weakened by diseases.

To prevent the irregular growth of melons.

Melons frequently, in certain situations, lose their circular form, and grow larger on one side than the other, and those mis-shapen fruits are always bad. To remedy this, take a small forked stick, in proportion to the size of the melon, and thrust it into the ground as nearly as possible to the tail of the fruit, taking the precaution to lay a little moss between the two prongs, and suspend the melon to the fork. In a few days the melon will resume its form, when the fork may be removed, and the operation is finished; the quality of the fruit remains undiminished.

To produce mushrooms.

If the water wherein mushrooms have been steeped or washed be poured upon an old bed, or if the broken parts of mushrooms be strewed thereon, there will speedily arise great numbers.

To produce new potatoes throughout the winter months.

Prepare a proper quantity of red sand, rather of a loamy nature, and mix it up with a portion of lime in powder; viz. about one-third, about 14 days before using it. This soil is to be spread about 3 inches thick at the bottom of any old wooden box, or on a very dry brick cellar floor—the cellar ought not to be exposed to the frost, nor yet too much confined from the air. Procure a measure or two of large potatoes of a prior year's growth: the sorts preferred are, the red apple potatoes, and the pink eyes of purple potatoes. Set these on the soil whole, about 3 inches apart, with the crown or the principal eye to the soil in preference; but put no soil over them. Plant about the 20th of September, which allows from 10 to 12 weeks for their growth; the old potatoes also throw out numerous sprouts or stalks, with many potatoes growing on them. The original potatoes for planting whole, for sets in September, should be such as were of perfect growth in the October of the preceding year, and well preserved during the winter. The sprouts which shoot from them should be removed by the end of April, and these sprouts, which will be from 6 to 26 inches long, may be planted with all their fibres in a garden, for a first crop; about June 15, the potatoe sets may be *sprit* again, and the sprouts planted for a second crop—and in September, the potatoe sets may be sprit a third time, and the sprouts of the last produce thrown away as useless—at the end of September, the original or seed potatoe is to be gently placed on the soils as before-mentioned for a Christmas crop. At the end of 3 months at furthest, the old potatoes should be carefully twisted from the new ones, and the sprouts taken off the old potatoe, and the old potatoe is then to be placed on its bottom or side, on a fresh bed of soil prepared as before, and left to produce another crop from fresh eyes placed next the soil: as you are to observe, that the old potatoe should not be set or placed twice on the same side, and you must take care at that time to remove the sprouts, to prevent the moisture from rotting the old potatoe. By the above method may be had 4 crops of new potatoes from one potatoe, exclusive of those produced from the sprouts planted in the garden in April and June, from which may be obtained 2 crops of well grown potatoes in September and October, weighing from 10 to 12 ounces each—the crops were very plentiful in proportion to the quantity planted.

The potatoes are remarkably well flavoured, and may be kept longer without prejudice after gathering, before dressed, than potatoes grown in the natural ground.

To raise peas in autumn.

The purple-flowered peas are found to answer best for a late crop in autumn, as they are not so liable to be mildewed as many of the other sorts, and will continue flowering till the first crop stops them. Those peas may be sown in July, August, or so late as the first week in September, if sown in a warm sheltered situation, andin a soil inclining to sand. —Soak the peas in warm milk, and after you have drawn the drills, water them before you sow the peas: it is best to sow them towards the evening. If the autumn should prove very dry, they will repuire frequent watering. When peas are sown before winter, or early in spring, they are very apt to be eaten by mice. To prevent this, soak the peas for a day or two in train oil before you sow them, which will encourage their vegetation, and render them so obnoxious to the mice, that they will not eat them.

To sow peas in circles instead of straight rows.

It is a great error in those persons who sow the rows of tall-growing peas close together. It is much better, in those sorts which grow six or eight feet high, to have only one row, and then to leave a bed, ten or twelve feet wide, for onions, carrots, or any crops which do not grow tall. The advantages which will be derived are, that the peas will not be drawn up so much, be stronger, will flower much nearer the ground, and in wet weather can be more easily gathered without wetting you. But instead of sowing peas in straight rows, if you will for mthe ground into circles of three feet diameter, with a space of two feet between each circle, in a row thirty feet long, you will have six circles of peas, each nine feet, in all fifty-four feet of peas, instead of thirty, on the same extent of ground. If you want more than one row of circles, leave a bed of ten or twelve feet before you begin another. For the very tall sorts, four feet circles will afford more room for the roots to grow in, and care must be taken, by applying some tender twigs, or other support, to prevent the circles from joining each other. This method is equally applicable for scarlet beans.

To prevent mice from destroying early sown peas.

The tops of furze, or whins, chopped and thrown into the drills, and thus covered up, by goading them in their attempt to scratch, is an effectual preventive. Sea sand, strewed pretty thick upon the surface, has the same effect. It gets in their ears, and is troublesome.

To cultivate common garden rhubarb.

It is not enough to give it depth of good soil, but it must be watered in draught; and in winter must be well covered with straw or dung. If this be attended to, your rhubarb will be solid when taken out of the ground, and your kitchen, if a warm one, when cut into large pieces, will soon fit it for use.

To force rhubarb.

Cover plants of the rheum *hybridum* with common garden-pots (number twelve), having their holes stopped. These are covered with fermenting dung, and the plants come very fine and quickly, but are much broken by the sides and tops of the pots. After it is all well up, the dung and pots are entirely taken off, and large hand-glasses are substituted in their stead, thickly covered with mats every night, and in dull weather. This process greatly improves their flavour, and gives a regular supply till that in the open air is ready for use.

Another method.

Inclose and cover the bed with open framework around, and on which place the dung, and with this treatment, the rhubarb will come up, very regularly, be of excellent quality, and want far less attention than is required by the former method; for the frame-work renders hand-glasses or any other cover, unnecessary. Care should be taken to lay the dung in such a manner that the top may be partly or wholly taken off at any time for the purpose of gathering or examination, without disturbing the sides.

This is a superior method of forcing the *rheum hybridum;* but still the forcing by pots will answer very well for any of the smaller growing species.

Third method.

To those who dislike the trouble of either frames or pots it may be useful to know that rhubarb will come in much quicker by being covered about six inches thick, with light litter; care should be taken in putting it on, and removing it, that no injury be done to the plants.

To dry rhubarb.

The best method of drying rhubarb, is to strip it off its *epidermis.* This is a long operation, but both time and expense are spared in the end by the promptness and regularity of the drying. Many cultivators of rhubarb, on a large scale, have repeated the experiment, and have met with the most decisive results.

To cure rhubarb.

The method of curing the true rhubarb is as follows:—Take the roots up when the stalks are withering or dying away, clean them from the earth with a dry brush, cut them in small pieces of about 4 or 5 inches in breadth, and about 2 in depth, taking away all the bark, and make a hole in the middle, and string them on pack thread, keeping every piece apart, and every morning, if the weather is fine, place them in the open part of the garden on stages, erected by placing small posts, about 6 feet high, in the ground and 6 feet asunder, into which fix horizontal pegs, about a foot apart, beginning at the top; and the rhubarb being sprung crosswise on small poles, place them on these pegs; so that if it should rain, you could easily remove each pole with the suspended pieces into any covered place. Never suffer them to be out at night, as the damp moulds them.

To cultivate onions.

Never use the hoe to the plant except it be for clearing the ground from weeds when the onions have shot out their leaves to their full size; and when they begin to get a little brown at the top, clear away all the soil from the bulb down to the ring, from whence proceed the fibres of the roots, and thus form a basin round each bulb, which catches the rain and serves as a receptacle for the water, from the watering-pot. The old bulbs will then immediately begin to form new ones, and if they are kept properly moist, and the soil is good, the cluster will be very large and numerous. This is not the only advantage of this mode of treatment, as the bulbs thus grown above ground are much sounder than those formed beneath the surface, and will keep quite as well as any other sort: which was not the case until this plan was adopted.

By a particular mode of culture, the onion in this country may be grown nearly in form and size like those from Spain and Portugal. The seeds of the Spanish or Portugal onion, should for this purpose be sown at the usual period in the spring, very thickly, and in poor soil, under the shade of apple or pear trees. In autumn the bulbs will not be much larger than peas, when they should be taken from the soil and preserved until the succeeding spring, and then planted at some distance from each other, in a good soil, and exposed to the sun. The bulbs will often exceed 5 inches in diameter, and will keep throughout the winter much better than those cultivated in the usual manner.

The Portuguese mode to cultivate onions.

They must first be raised on a nursery bed, in the warmest and most sheltered part of the garden, as early in the month of February as the season will permit; as soon as the plants are strong enough to bear removal, that is to say, when they are about the thickness of a goosequill, let some puddle be prepared with garden mould and water, with a small proportion of soot, the whole to be of the consistence of thick cream; as the plants are drawn from the seed bed, let their roots be instantly immersed in the puddle, and there remain till they are transplanted, where they are permanently to continue. The plants should be set out about six inches apart, and the ground kept perfectly clear of weeds, and regularly refreshed with water in hot and dry weather. On this latter circumstance will very much depend their size and mildness; to this is owing the superiority of onions grown in Portugal, which are all cultivated in the way here recommended. By keeping the roots in puddle, if it were only for a few minutes, during the interval between the taking up and transplanting, they are prevented from receiving the slightest check from the access of the atmospheric air, and will require no immediate watering when first transplanted.

To obtain a good crop of onions.

In order to obtain a good crop of onions, it is proper to sow at different seasons, viz. in light soils, in August, January, or early in February; and, in heavy wet soils, in March, or early in April. Onions, however, should not be sown in January, unless the ground be in a dry state, which is not often the case at so early a period of the season; but if so, advantage should be taken of it.

To cultivate asparagus.

That part of the garden which is longest exposed to the sun, and least shaded by shrubs and trees, is to be chosen for the situation of the asparagus quarter. A pit is then to be dug 5 feet in depth, and the mould which is taken from it must be sifted, taking care to reject all stones, even as low in size as a filbert nut. The best parts of the mould must then be laid aside for making up the beds.

The materials of the bed are then to be laid in the following proportion and order:—

Six inches of common dung-hill manure,—8 inches of turf,—6 inches of dung as before,—6 inches of sifted earth,—8 inches of turf,—6 inches of very rotten dung,—8 inches of the best earth.

The best layer of earth must then be well mixed with the last of dung.

The quarter must now be divided into beds five feet wide, by paths constructed of turf, two feet in breadth, and one in thickness. The asparagus must be planted about the end of March, 18 inches asunder. In planting them, the bud, or top of the shoot, is to be placed at the depth of an inch and a half in the ground, while the roots must be spread out as wide as possible, in the form of an umbrella. A small bit of stick must be placed as a mark at each plant, as it is laid in the ground. As soon the earth is settled and dry, a spadeful of fine sand is to be thrown on each plant, in the form of a mole-hill. If the asparagus plants should have begun to shoot before their transplantation, the young shoots should be cut off, and the planting will, with these precautions, be equally successful; though it should be performed in this country even as late as July. Should any of the plants originally inserted have died, they also may be replaced at this season. The plants ought to be two years old when they are transplanted: they will even take at three, but at four they are apt to fail.

In three years the largest plants will be fit to cut for use. If the buds be sufficiently large to furnish a supply in this manner, the asparagus shoots should be cut as fast as they appear; otherwise they must be left till the quantity required has pushed forth; in which case the variety in colour and size prevents them from having so agreeable an appearance. An iron knife is used for this purpose.

The asparagus-bed now described will generally last 30 years; but if they be planted in such abundance as to require cutting only once in 27 years, half the bed being always in a state of reservation, it will last a century or more. The turf used in making the beds should be very free from stones.

Another method.

Make the bed quite flat, 5 feet wide, of good soil, without any dung, long, or short: sow it with onions. Then sow two asparagus seeds (lest one should fail) about 1 inch deep, near each other; twelve inches each way sow two more; and if the spring is cold and dry, let the weeds grow until rain comes. In October, cover the bed with manure, or rotten hot-bed. The next spring remove the weakest of the two plants, and keep the bed free from weeds. To raise seed, select the thickest stems: after blossoming sufficient, take off the tops, to make the seed strong. This is also the best way to raise double ten-weeks and Bromptom stocks. Six pounds are sufficient for any strong plant: setting them to flower near double ones is of no use. The excess in petal arises from cultivation, and transplanting into rich soil: wild flowers are seldom double. Keep all small seeds in the pod until you sow them.

To force asparagus.

The pits in which succession pines are kept in the summer have at bottom a layer of leaves about 18 inches deep, covered with the same thickness of tan, which becomes quite cold when the pines are removed. In one of the pits should be spread over the entire surface of the old tan a quantity of asparagus roots, and cover it with six inches more of tan, and apply linings of hot dung, and successively renew it round the sides, keeping up thereby a good heat. The above mode was practised in the middle of December, by Mr. William Ross, and in five weeks the crop was fit for use. As soon as the shoots made their appearance, and during the day time, he took off the lights introducing as much air as possible, which gave them a good natural colour, and the size was nearly as large as if they had been produced in the open ground, at the usual season.

To insure perfect success, it is expedient to have good roots to place in the bed; the usual plan of taking them from the exhausted old beds of the garden, is bad. If they are past their best, and unfit to remain in the garden, is bad. If they are past their best, and unfit to remain in the garden, they cannot be in a good state for forcing. Young roots, four years old from the seed, are much preferable: they are costly if they are to be purchased every year; but where there is sufficient space, a regular sowing for this particular purpose should be made annually, and thus a succession of stock secured.

To render asparagus more productive.

In the formation of beds the male plants only should be selected, which may easily be done by not planting from the seed-bed until they have flowered. When the plants are one year old, transplant them into the other beds, at six inches distance; let them remain there until they flower, which will be in most of them in the second year; put a small stick to each male plant, to mark them, and pull up the females, unless it is wished to make a small plantation with one of them, to prove the truth of the experiment.

Towards the end of July, especially if it be rainy weather, cut down the stalks of the asparagus, fork up the beds, and rake them smooth. If it be dry, water them with the draining of a dung-hill; but instead of leaving them round, leave them rather flat or hollow in the middle, the better to retain the water or rain. In about twelve or fourteen days the asparagus will begin to appear, and if it be dry weather, continue watering one or twice a week. By this method asparagus may be cut about the end of September; at which time the hot-beds will succeed this; so that by making five or six hot-beds during the winter, a regular succession of it may be had every month of the year.

To raise capsicum, and make Cayenne pepper.

Capsicum pepper is produced from the capsicum, which is raised for ornament, with many other annual flowers, or for pickling the green pods, and is the seed and pod when ripe. In March or April, procure some pods of any of the sorts of capsicums, as there are many varieties of them of different shapes; take out the seeds, and sow them on a bed not too thick. When they are about four inches high, prick them out on the hot-bed at six inches asunder; or put each into a small pot, or three into a large one, and keep them still under the glasses. In June, when the weather is settled, plant them all in a warm situation, in a rich earth, where they are to remain, some on the borders of the flower gaiden, and some into larger pots, which you can shelter in bad weather.

To cultivate the Alpine strawberry.

The process consists of sowing the seed on a moderate hot-bed, in the beginning of April, and removing the plants, as soon as they have acquired sufficient strength, to beds in the open ground. They will begin to blossom after midsummer, and afford an abundant late autumnal crop. This strawberry ought always to be treated as our annual plants.

To cultivate sea kail.

The seed is to be sown in the month of April in drills, on a good light dry soil: as the plants rise, thin them, and keep them clean. The first winter, earth them up to protect them from the frost; the following summer, thin them to about eighteen inches distance, leaving the best plants. At Christmas, take away the decayed leaves and cover up each plant with a large deep pan or flower-pot, upon which lay a quantity of the leaves of trees, to keep off the frost, and create heat to the plants. Stable litter is sometimes used instead of leaves, but is apt to give the plants a rank taste. In the following month of April, the pots will be quite full of fine tender blanched shoots, which may be cut over by the ground (but not too near) and the stumps covered up again for a second crop: this may be repeated with the same plants two or three times during the spring, before the plants are left for summer's growth. With this treatment the sea kail, if sufficiently boiled in two waters, will be found equal to any asparagus or brocoli, and may be eaten with butter, or butter and vinegar, and pepper, as may suit the taste. The plant being a perennial one, will last for any length of time with proper culture.

To cultivate radishes to have them at all seasons.

Take seeds of the common radish, and lay them in rain water to steep for 24 hours; then put them quite wet, into a small linen bag, well tied at the mouth with a packthread. If you have steeped a large quantity of seeds, you may divide them into several bags. Then expose the bags in a place where they will receive the greatest heat of the sun, for about 24 hours, at the end of which time the seed will begin to grow, and you may then sow it in the usual manner, in earth well exposed to the heat of the sun. Prepare two small tubs to cover each other exactly. These may be easily provided, by sawing a small cask through the middle, and they will serve in winter; in summer one will be sufficient for each kind of earth that has been sown. As soon as you have sown your seeds you must cover them with your tub, and at the end of three days you will find radishes of the size and thickness of young lettuces, having at their extremities two small round leaves, rising from the earth, of a reddish colour. These radishes, cut or pulled up, will be excellent, if mixed with a salad, and they have a much more delicate taste than the common radishes which are eaten with salt.

By taking the following precautions you may have them in the winter, and even during the hardest frosts: after having steeped the seeds in warm water, and exposed them to the sun as already directed, or in a place sufficiently hot to make them shoot forth, warm the two tubs; fill one of them with earth well dunged; sow your seeds, thus prepared, in one of them, and cover it with the other tub; you must then be careful to sprinkle it with warm water as often as may be necessary. Then carry the two tubs closely joined, taking care they cover each other, into a warm vault or cellar, and at the end of 15 days you may gather a fine salad.

To increase potage herbs.

The manzel worzel would, if permitted to run up, grow to a great height, and afford a good plucking of potage vegetables twice a week in winter (only.) It must be planted late, but may continue in the ground two or three years, when its roots will be wasted, the herbage becomes dwarfish, and it must be renewed by seed.

To guard cabbages from the depredations of caterpillars.

Sow with hemp all the borders of the ground wherein the cabbage is planted: and although the neighbourhood be infested with caterpillars, the spaee inelosed by the hemp will be perfectly free, and not one of these vermin will approaeh it.

To banish the red spider.

Cut off the infected leaf. The leaf once attacked soon decays and falls off; but in the mean time the animals remove to another, and the leaf, from the moment of attaek, seems to cease to perform its office; but persevere in the amputation, and the plants become healthy.

To stop the ravages of caterpillars from shrubs, plants, and vegetables.

Take a chafing-dish, with lighted charcoal, and place it under the branches of the tree, or bush, whereon are the caterpillars: then throw a little brimstone on the coals. The vapour of the sulphur, which is mortal to these insect, and the suffocating fixed air arising from the charcoal, will not only destroy all that are on the tree, but will effeetually prevent the shrubs from being, at that season infested with them. A pound of sulphur will clear as many trees as grow on several acres.

Another method of driving these insects off fruit-trees is, to boil together a quantity of rue, wormwood, and common tobacco (of each equal parts,) in common water. The liquor should be very strong. Sprinkle this on the leaves and young branches every morning and evening during the time the fruits is ripening.

To destroy insects on plants.

Tie up some flowers of sulphur in a piece of muslin or fine linen, and with this the leaves of young shoots of plants should be dusted, or it may be thrown on them by means of a eommon swansdown puff, or even by a dredging-box.

Fresh assurances have repeatedly been received of the powerful influence of sulphur against the whole tribe of inseets and worms which infest and prey on vegetables. Sulphur has also been found to promote the health of plants, on which it was sprinkled; and that peach trees in particular were remarkably improved by it, and seemed to absorb it. It has been likewise observed, that the verdure, and other healthful appearances, were perceptibly increased; for the quantity of new shoots and leaves formed subsequently to the operation, and having no sulphur on their surfaces, served as a kind of the comparative index, and pointed out distinctly the accumulation of health.

To cultivate the sun-flower.

The sun-flower, kidney beans, and potatoes, mixed together, agree admirably; the neighbourhood of the sun-flower, proving advantageous to the potatoe. It is a well authenticated fact, that with careful attention the sun-flower will make excellent oil.

The marc, or refuse of the sun-flower, after the oil is expressed, may be prepared as a light viand for hogs and goats, pigeons and poultry, which will banquet on it to satiety. Query, would it not make good oil cakes for fattening pigs? if brought into notice, it might become an object of magnitude. Forty-eight pounds of sun-flowers will produce twelve pounds of oil. In fine, I esteem it as worthy of eonsideration, for 1st. In the scale of excellence, it will render the use of grain for feeding hogs, poultry, pigeons, &c. comparatively unnecessary. 2. As it resembles olive oil, would it not be found, on examination, competent to supply its place? whatever may be the points of difference, it certainly may be servieeable in home consumption and manufactures. 3. Its leaves are to be plucked as they become yellow and dried. 4. It affords and agreeable and wholesome food to sheep and rabbits. To goats and rabbits, the little branches are a delicious and luxurious gratification, as is also the disc of the pure flower, after the grains have been taken out. Rabbits eat the whole except the woody part of the plant, which is well adapted for the purpose of fuel. 5. Its alkalic qualities appear to deserve notice, forty quintals yield eighty pounds of alkali, a produee four times superior to that of any other plant we are acquainted with, maize excepted. 6. Might it not be used as a ley? And minuter observation would probably convert it into soap, the basis of both being oil.

Dig and trench about it, as both that and the potatoe love new earths. Let the rows be twenty iuehes distant from each other, and it will be advantageous, as the turnesole loves room.

Three grains are to be sown distant some inches from eaeh other, and when their stems are from eight to twelve inches high, the finest of the three only to be left. Two tufts of French beans to be planted with potatoes. The French beans will elimb up the sides of the sun-flower, which will aet and uniformly support like sticks, and the sun-flower will seeond this disposition, by keeping off the great heat from the potatoe, and produce more than if all had been planted with potatoes.

Each sun-flower will produce one or two pounds, and the acre will bring in a vast amount, or contain one thousand pounds, being one-third more than grain.

To economize the sun-flower.

The cultivation of the annual sun-flower is recommended to the notice of the public, possessing the advantage of furnishing abundance of agreeable fodder for cattle in their leaves. When in flower, bees flock from all quarters to gather honey. The seed is valuable in feeding sheep, pigs, and other animals: it produces a striking effect in poultry, as occasioning them to lay more eggs, and it yields a large quantity of excellent oil, by pressure; the dry stalks burn well, the ashes affording a considerable quantity of alkali.

To remove herbs and flowers in the summer.

If you have occasion to transplant in the summer season, let it be in the evening after the heat is passed; plant and water the same immediately, and there will be no danger from the heat next day; but be careful in digging up the earth you do not break any of the young shoots, as the sap will exude out of the same, to the great danger of the plants.

Method of growing flowers in winter.

In order to produce this effect, the trees or shrubs being taken up in the spring, at the time when they are about to bud, with some of their own soil carefully preserved among the roots, must be placed upright in a cellar till Michaelmas; when, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hot-house, where they must every morning be moistened or refreshed with a solution of half an ounce of sal ammoniac in a pint of rain water. Thus, in the month of February, fruits, or roses will appear, and with respect to flowers in general, if they ure sown in pots at or before Michaelmas, and watered in a similar manner, they will blow at Christmas.

To preserve wood from insects.

In the East Indies aloes are employed as a varnish to preserve wood from worms and other insects; and skins, and even living animals, are anointed with it for the same reason. The havoc committed by the white ants, in India, first suggested the trial of aloe juice to protect wood from them, for which purpose the juice is either used as extracted, or in solution by some solvent.

To preserve young shoots from slugs and earwigs.

Earwigs and slugs are fond of the points of the young shoots of carnations and pinks, and are very troublesome in places where they abound; to prevent them they are sometimes insulated in water, being set in cisterns or pans. If a pencil dipped in oil was drawn round the bottom of the pots once in two days, neither of these insects, or ants, would attempt them. Few insects can endure oil, and the smallest quantity of it stops their progress.

Vegetable liquor to hasten the blowing of bulbous rooted flowers.

Take nitre, three ounces, common salt, one ounce, pot-ash, one ounce, sugar, half an oz. rain water, one pound. Dissolve the salts in a gentle heat, in a glazed earthen pot, and when the solution is complete, add the sugar, and filter the whole. Put about eight drops of this liquor into a glass jar, filled with rain or river water. The jars must be kept always full, and the water removed every ten or twelve days, adding each time a like quantity of the liquor: the flowers also must be placed on the corner of a chimney-piece, where a fire is regularly kept. The same mixture may be employed for watering flowers in pots, or filling the dishes in which they are placed, in order to keep the earth or the bulbs or plants which they contain in astate of moisture.

To restore flowers.

Most flowers begin to droop and fade after being kept during twenty-four hours in water; a few may be revived by substituting fresh water; but all (the most fugacious, such as poppy, and perhaps one or two others excepted,) may be restored by the use of hot water. For this purpose place the flowers in scalding water, deep enough to cover about one-third of the length of the stem: by the time the water has become cold, the flowers will have become erect and fresh; then cut off the coddled ends of the stems, and put them into cold water.

To preserve flower seeds.

Those who are curious about saving flower-seeds must attend to them in the month of August. Many kinds will begin to ripen apace, and should be carefully sticked and supported to prevent them from being shaken, by high winds, and so partly lost. Others should be defended from much wet: such as asters, marygolds, and generally those of the class syngenesia; as from the construction of their flowers they are apt to rot, and the seeds to mould in bad seasons. Whenever they are thought ripe, or indeed any others in wet weather, they should be removed to an airy shed or loft, gradually dried, and rubbed or beat out at conveniency.

To improve all sorts of seeds.

Charles Miller, son of the celebrated botanist, published a recipe for fertilizing seed, and tried it on wheat, by mixing lime, nitre, and pigeons' dung in water, and therein steeping the seed. The produce of some of these grains is stated at 60, 70, and 80 stems, many of the ears 5 inches long, and 60 corns each, and none less than 40.

To preserve seeds for a long time.

When seeds are to be preserved longer than the usual period, or when they are to be sent to a great distance, sugar, salt, cotton, saw dust, sand, paper, &c. have been adopted with different degrees of success. Chinese seeds, dried by means of sulphuric acid, in Leslie's manner, may be afterwards preserved in a vegetating state for any necessary length of time, by keeping them in an airy situation in common brown paper, and occasionally exposing them to the air on a fine day, especially after damp weather. This method will succeed with all the larger mucilaginous seeds. Very small seeds, berries, and oily seeds, may probably require to be kept in sugar, or among currants or raisins.—*Horticult. Trans. Vol.* 3.

To preserve exotic seeds.

Five years ago, says a correspondent of the Monthly Magazine, I had a collection of seeds sent me from Serampoore, in the East Indies, which have been since that period kept in small bottles, in a dry situation, without corks; last spring some of them were sown, and produced strong healthy plants, under the following system; but if taken from the bottles and sown in the ordinary way, I have found them either to fail altogether, or to produce germination so weak that the greatest care can never bring them to any perfection.

I have long observed that oxygen is necessary to animal and vegetable life, and that soil which has imbibed the greatest proportion of that air or gas, yields the strongest germination, and with the least care produces the best and most healthy plants: under that impression, I prepare the soil, by adding to it a compost made from decayed vegetables, night soil, and fresh earth, well mixed together and turned several times; but should the weather be dry, I have generally found the compost better by adding water to keep it moist. On the evening before I intended to sow the seeds, I have immersed them in a weak solution of oxygenated muriatic acid, and suffered them to remain until they begun to swell.

By pursuing this treatment even with our English annual seeds, I am gratified with an earlier germination, and with generally stronger and more healthy plants.

To dry flowers.

They should be dried off as speedily as possible, the calyces, claws, &c. being previously taken off; when the flowers are very small, the calyx is left, or even the whole flowering spike, as in the greatest portion of the labiate flowers; compound flowers, with pappous seeds, as coltsfoot, ought to be dried very high, and before they are entirely opened, otherwise the slight moisture that remains would develope the pappi, and these would form a kind of cottony nap, which would be very hurtful in infusions, by leaving irritating particles in the throat.—Flowers of little or no smell may be dried in a heat of 75 to 100 deg. Fahr. the succulent petals of the liliaceous plants, whose odour is very fugaceous, cannot well be dried; several sorts of flowering tops, as those of lesser centaury, lilly of the valley, wormwood, mellilot, water germander, &c. are tied up in small parcels and hung up, or exposed to the sun, wrapped in paper cornets, that they may not be discoloured. The colour of the petals of red roses is preserved by their being quickly dried with heat, after which the yellow anthers were separated by sifting; the odour of roses and red pinks is considerably increased by drying.

To dry tops, leaves, or whole herbs.

They should be gathered in a dry season, cleansed from discoloured and rotten leaves, screened from earth or dust, placed on handles covered with blotting paper and exposed to the sun, or the heat of a stove, in a dry airy place. The quicker they are dried the better, as they have less time to ferment or grow mouldy; hence they should be spread thin and frequently turned; when dried they should be shaken in a large meshed sieve to get rid of the eggs of any insects. Aromatic herbs ought to be dried quickly with a moderate heat, that their odour may not be lost. Cruciferous plants should not be dried, as in that case they lose all their antiscorbutic qualities. Some persons have proposed to dry herbs in a water bath, but this occasions them, as it were, to be half boiled in their own water.

To dry roots.

They should be rubbed in water to get rid of the dirt and also some of the mucous substance that would otherwise render them mouldy—the larger are then to be cut, split, or peeled; but in most aromatic roots, the odour residing in the bark, they must not be peeled; they are then to be spread on sieves or hurdles, and dried in a heat of about 120 deg. Fahr. either on the top of an oven, in a stove, or a steam closet, taking care to shake them occasionally to change the surface exposed to the air. Thick and juicy roots, as rhubarb, briony, piony, water-lilly, &c. are cut in slices, strung upon a thread, and hung in a heat of about 90 to 100 deg. Fahr. Squills are scaled, threaded and dried round the tube of a German stove, or in a hot closet. Rhubarb should be washed to separate that mucous principle which would otherwise render it black and soft when powdered. Potatoes are cut in slices and dried to form a sago.

To preserve roots.

These are preserved in different ways, according to the object in view. Tuberous roots, as those of the *pahlia*, *pæonia*, tuberose, &c. intended to be planted in the succeeding spring, are preserved through the winter in dry earth, in a temperature rather under than above what is natural to them. So may the bulbous roots of commerce, as hyacinths, tulips, onions, &c. but for convenience, these are kept either loose in cool dry shelves or lofts, or the finer sorts in papers, till the season of planting.

Roots of all kinds may be preserved in an ice-house till the return of the natural crop.

After stuffing the vacuities with straw, and covering the surface of the ice with the same material, place on it case boxes, dry ware casks, baskets, &c. and fill them with turnips, carrots, beet roots, and in particular, potatoes. By the cold of the place, vegetation is so much suspended, that all these articles may be thus kept fresh and uninjured, till they give place to another crop in its natural season.

To gather vegetables.

This is, in part, performed with a knife, and part by fracture or torsion with the hand. In all cases of using the knife, the general principle of cutting is to be attended to, leaving also a sound section on the living plant. Gathering with the hand ought to be done as little as possible.

To preserve vegetables.

This is effected in cellars or sheds, of any temperature, not lower, nor much above the freezing point. Thus cabbages, endive, chiccory, lettuce, &c. taken out of the ground with their main roots, in perfect dry weather, at the end of the season, and *laid in*, or partially immersed in sand or dry earth, in a close shed, cellar, or ice-cold room, will keep through the winter, and be fit for use till spring, and often till the return of the season of their produce in the garden.

Time for gathering fruit.

This should take place in the middle of a dry day. Plums readily part from the twigs when ripe: they should not be much handled, as the bloom is apt to be rubbed off. Apricots may be accounted ready, when the side next the sun feels a little soft upon gentle pressure with the finger. They adhere firmly to the tree, and would over-ripen on it and become mealy. Peaches and nectarines, if moved upwards, and allowed to descend with a slight jerk, will separate, if ready; and they may be received into a tin funnel lined with velvet, so as to avoid touching with the fingers or bruising.

A certain rule for judging of the ripeness of figs, is, to notice when the small end of the fruit becomes of the same colour as the large one.

The most transparent grapes are the most ripe. All the berries in a bunch never ripen equally; it is therefore proper to cut away unripe or decayed berries before presenting the bunches at table.

Autumn and winter pears are gathered, when dry, as they successively ripen.

Immature fruit never keeps so well as that which nearly approaches maturity. Winter apples should be left on the trees till there be danger of frost; they are then gathered on a dry day.

To gather orchard fruits.

In respect to the time of gathering, the criterion of ripeness, adopted by Forsyth, is their beginning to fall from the tree. Observe attentively when the apples and pears are ripe; and do not pick them always at the same regular time of the year, as is the practice with many. A dry season will forward the ripening of fruit, and a wet one retard it; so that there will sometimes be a month's difference in the proper time of gathering. If this is attended to, the fruit will keep well, and be plump; and not shrivelled, as is the case with all fruit that is gathered before it is ripe.

The art of gathering, is to give them a lift, so as to press away the stalk, and if ripe, they readily part from the tree. Those that will not come off easy should hang a little longer; for when they come hardly off they will not be so fit to store, and the violence done at the foot-stalk, may injure the bud there formed for the next year's fruit.

Let the pears be quite dry when pulled, and in handling avoid pinching the fruit, or in any way bruising it, as those which are hurt not only decay themselves, but presently spread infection, to those near them: when suspected to be bruised, let them be carefully kept from others, and used first: as gathered, lay them gently in shallow baskets.

To preserve green fruits.

Green fruits are generally preserved by pickling or salting, and this operation is usually performed by some part of the domestic establishment.

To preserve ripe fruit.

Such ripe fruit as may be preserved, is generally laid up in lofts and bins, or shelves, when in large quantities, and of baking qualities; but the better sorts of apples and pears are now preserved in a system of drawers, sometimes spread out in them, at other times wrapped up in papers; or placed in pots, cylindrical earthen vessels, among sand, moss, paper, chaff, hay, saw dust, &c. or sealed up in air tight jars or casks, and placed in the fruit cellar.

To preserve pears.

Having prepared a number of earthenware jars, and a quantity of dry moss, place a layer of moss and pears alternately, till the jar is filled, then insert a plug, and seal around with melted rosin. These jars are sunk in dry sand to the depth of a foot; a deep cellar is preferable for keeping them to any fruit room.

Another method.—Choice apples and pears are preserved in glazed jars, provided with covers. In the bottom of the jars, and between each layer of fruit, put some pure pit-sand, which has been thoroughly dried. The jars are kept in a dry airy situation, as cool as possible, but secure from frost. A label on the jar, indicates the kind of fruit, and when wanted, it is taken from the jars, and placed for some time on the shelves of the fruit room.

In this way colmarts, and other fine French pears, may be preserved till April; the terling till June; and many kinds of apples till July, the skin remaining.

To preserve apples and pears.

The most successful method of preserving apples and pears, is by placing them in glazed earthen vessels, each containing about a gallon, and surrounding each fruit with paper. These vessels being perfect cylinders, about a foot each in height, stand very conveniently upon each other, and thus present the means of preserving a large quantity of fruit in a very small room; and if the spaces between the top of one vessel and the base of another, be filled with a cement composed two parts of the curd of skimmed milk, and one of lime, by which the air will be excluded, the latter kinds of apples and pears will be preserved with little change in their appearance, and without any danger of decay, from October, till February and March. A dry and cold situation, in which there is little change of temperature, is the best for the vessels: but the merits of the pears are greatly increased by their being taken from the vessels about ten days before they are wanted for use, and kept in a warm room, for warmth at this, as at other periods, accelerates the maturity of the pear.

To preserve various sorts of fruit.

By covering some sorts of cherry, plum, gooseberry, and currant trees, either on walls or on bushes with mats, the fruit of the red and white currant, and of the thicker skinned gooseberry-trees, may be preserved till Christmas and later. Grapes, in the open air, may be preserved in the same manner; and peaches and nectarines may be kept a month hanging on the trees after they are ripe.

Arkwright, by late forcing, retains plump grapes on his vines till the beginning of May, and even later, till the maturity of his early crops. In this way, grapes may be gathered every day in the year.

Another method.—But the true way to preserve keeping-fruit, such as the apple and pear, is to put them in air-tight vessels, and place them in the fruit cellar, in a temperature between 32 and 40 degrees. In this way all the keeping sorts of these fruits may be preserved, in perfect order for eating, for one year after gathering.—*Horticultural Trans.* vol. iii.

To store fruit.

Those to be used first, lay by singly on shelves, or on the floor, in a dry southern room, on clean dry moss, or sweet dry straw, so as not to touch one another. Some, or all the rest, having first laid a fortnight singly, and then nicely culled, are to be spread on shelves, or on a dry floor. But the most superior way is, to pack in large earthen, or China, or stone jars, with very dry long moss at the bottom, sides, and also between them, if it might be. Press a good coat of moss on the top, and then stop the mouth close with cork, or otherwise, which should be rosined round about with a 20th part of bees' wax in it. As the object is effectually to keep out air (the cause of putrefaction,) the jars, if earthen, may be set on dry sand, which put also between, round, and over them, to a foot thick on the top. In all close storing, observe there should be no doubt of the soundness of the fruit. Guard, in time, from frost those that lie open. Jars of fruit must be soon used after unsealing.

To keep apples and pears for market.

Those who keep their fruit in store-houses, for the supply of the London and other markets, as well as those who have not proper fruit-rooms, may keep their apples and pears in baskets or hampers; putting some soft paper in the bottoms and round the edges of the basket, &c. to keep the fruit from being bruised; then put in a layer of fruit, and over that another layer of paper; and so on, a layer of fruit and of paper alternately, till the basket or hamper be full: cover the top with paper three or four times double, to exclude the air and frost as much as possible. Every different sort of fruit should be packed separately; and it will be proper to fix a label to each basket or hamper, with the name of the fruit that it contains, and the time of its being fit for use.

Another way.

But the best way of keeping fruit, is to pack it in glazed earthen jars. The pears or apples must be separately wrapped up in soft paper, then put a little well dried bran in the bottom of the jar, and over the bran a layer of fruit; then a little more bran to fill up the interstices between the fruit, and to cover it; and so on, a layer of fruit and bran alternately, till the jar be full: then shake it gently, which will make the fruit and bran sink a little; fill up the vacancy at top with a piece of bladder to exclude the air; then put on the top or cover of the jar, observing that it fits as closely as possible. These jars should be kept in a room where there can be a fire in wet or damp weather.

Nicol considers it an error to sweat apples, previous to storing them. The fruit ever after retains a bad flavour. It should never be laid in heaps at all; but if quite dry when gathered, should be immediately carried to the fruit-room, and be laid, if not singly, at least thin on the shelves. If the finer fruits are placed on any thing else than a clean shelf, it should be on fine paper. Brown paper gives them the flavour of pitch. The fine larger kind of pears should not be allowed even to touch one another, but should be laid quite single and distinct. Apples, and all other pears, should be laid thin; never tier above tier. Free air should be admitted to the fruit-room always in good weather, for several hours every day; and in damp weather a fire should be kept in it. Be careful at all times to exclude frost from the fruit, and occasionally to turn it when very mellow.

To preserve fruits or flowers.

Mix 1 pound of nitre with 2 pounds of bole ammoniac, and 3 pounds of clean common sand. In dry weather, take fruit of any sort, not fully ripe, allowing the stalks to remain, and put them one by one into an open glass, till it is quite full; cover the glass with oiled cloth, closely tied down; put the glass 3 or 4 inches into the earth, in a dry cellar, and surround it on all sides, to the depth of 3 or 4 inches with the above mixture. This method will preserve the fruit quite fresh all the year round.

To preserve walnuts.

Walnuts for keeping should be suffered to drop off themselves, and afterwards laid in an open airy place till thoroughly dried; then pack them in jars, boxes, or casks, with fine clean sand, that has been well dried in the sun, in an oven, or before the fire, in layers of sand and walnuts alternately; set them in a dry place, but not where it is too hot. In this manner, they have been kept good till the latter end of April. Before sending them to table, wipe the sand clean off: and if they have become shrivelled, steep them in milk and water for 6 or 8 hours before they are used; this will make them plump and fine, and cause them to peel easily.

To preserve chesnuts and filberts.

The chesnut is to be treated like the walnut, after the husk is removed, which in the chesnut, opens of itself. Chesnuts and walnuts may be preserved during the whole winter, by covering them with earth, as cottagers do potatoes.

Filberts may always be gathered by hand, and should afterwards be treated as the walnut. Nuts intended for keeping should be packed in jars or boxes of dry sand.

To preserve medlars and quinces.

The medlar is not good till rotten ripe. It is generally gathered in the beginning of November, and placed between two layers of straw, to forward its maturation. Others put medlars in a box on a three inch layer of fresh bran, moistened well with soft warm water; then strew a layer of straw between them, and cover with fruit two inches thick; which moisten also, but not so wet as before. In a week or ten days after this operation they will be fit for use.

Quinces are gathered in November when they are generally ripe. After swelling in a heap for a few days, they are to be wiped dry, and placed on the fruit-shelf, at some distance from each other.

To pack fruit for carriage.

If fruit is to be sent to any considerable distance, great care should be taken in packing it: it should not be done in baskets, as they are liable to be bruised among heavy luggage, and the fruit of course will be impaired. Forsyth, therefore, recommends boxes made of strong deal, of different sizes, according to the quantity of fruit to be packed. The following are the dimensions of the boxes in which fruit used to be sent by the coach to Windsor and Weymouth, for the use of his late Majesty and the Royal Family.

The larger box is 2 feet long, 14 inches broad, and the same in depth. The smaller box is one foot nine inches long, one foot broad, and the same in depth. These boxes are made of inch deal, and well secured with three iron clamps at each corner; they have two small iron handles, one at each end, by which they are fastened to the roof of the coach: In these boxes are sent melons, cherries, currants, pears, peaches, nectarines, plums, and grapes; they are first wrapped in pine leaves, and then in paper. The cherries and currants are first packed in a flat tin box, one foot four inches long, ten inches broad, and four deep.

In packing, proceed thus:—first put a layer of fine long dry moss in the bottom of the tin box, then a layer of currants or cherries, then another layer of moss, and so on, alternately, fruit and moss, until the box is so full, that when the lid is hasped down, the fruit may be so finely packed as to preserve them from friction. Then make a layer of fine moss, and short, soft dry grass, well mixed, in the bottom of the deal box: pack in the melons with some of the same, tight in between all the rows, and also between the melons in the same row, till the layer is finished; choosing the fruit as nearly of a size as possible, filling up every interstice with the moss and grass. When the melons are packed, put a thin layer of moss and grass over them, upon which place the tin box with the currants, packing it firmly all round with moss to prevent it from shaking; then put a thin layer of moss over the box, and pack the pears firmly (but so as not to bruise them) on that layer, in the same manner as the melons; and so on with the peaches, nectarines, plums, and lastly the grapes, filling up the box with moss, that the lid may shut down so tight as to prevent any friction among the fruit. The boxes should have locks and two keys, which may serve for them all: each of the persons who pack and unpack the fruit having a key. The moss and grass should always be returned in the boxes, which, with a little addition, will serve the whole season; being shaked up and well aired after each journey, and keeping it sweet and clean. After the wooden box is locked, cord it firmly.

If fruit be packed according to the above directions, it may be sent to the farthest parts of the kingdom, by coaches or waggons with perfect safety.

Other methods for packing fruit.

Fruits of the most delicate sorts are sent from Spain and Italy to England, packed in jars with saw-dust from woods not resinous or otherwise ill tasted. One large branch of grapes is suspended from a twig or pin laid across the mouth of the jar, so as it may not touch either the bottom or sides: saw-dust or bran is then strewed in, and when full, the jar is well shaken to cause it to settle: more is then added till it is quite full, when the supporting twig is taken away, and the earthen cover of the jar closely fitted and sealed, generally with fine stucco.

In the same way grapes may be sent from the remotest parts of Scotland or Ireland to the metropolis. When the distance is less, they may be sent enveloped in fine paper, and packed in moss. The simplest mode for short distances is to wrap each bunch in fine soft paper, and lay them on a bed of moss in a broad flat basket with a proper cover.

Cherries and plums may be packed in thin layers, with paper and moss between each.

Peaches, apricots, and the finer plums, may each be wrapped separately in vine or other leaves, or fine paper, and packed in abundance of cotton, flax, fine moss, or dried short grass. Moss is apt to communicate its flavour to fine fruits, and so is short grass, if not thoroughly dried and sweetened. Cotton best preserves the bloom on peaches and plums.

To preserve grapes.

Where there are several bunches in one branch, it may be cut off, leaving about 6 inches in length or more, of the wood, according to the distsnce between the bunches, and a little on the outside of the fruit at each end; seal both ends with common bottle wax, then hang them across a line in a dry room, taking care to clip out, with a pair of scissars, any of the berries that begin to decay or become mouldy, which, if left, would taint the others. In this way grapes may be kept till February; but if cut before the bunches are too ripe they may be kept much longer.

Grapes may be kept by packing them in jars (every bunch being first wrapped up in soft paper,) and covering every layer with bran, well dried, laying a little of it in the bottom of the jar; then a layer of grapes, and so on, a layer of bran and grapes alternately, till the jar is filled: then shake it gently, and fill it to the top with bran, laying some paper over it, and covering the top with a bladder tied firmly on to exclude the air; then put on the top or cover of the jar, observing that it fits close. These jars should be kept in a room where a fire can be kept in wet damp weather.

French method of preserving grapes.

Take a cask or barrel inaccessible to the external air, and put into it a layer of bran dried in an oven, or of ashes well dried and sifted. Upon this place a layer of bunches of grapes well cleaned, and gathered in the afternoon of a dry day, before they are perfectly ripe. Proceed thus, with alternate layers of bran and grapes, till the barrel is full, taking care that the grapes do not touch each other, and to let the last layer be of bran; then close the barrel, so that the air may not be able to penetrate, which is an essential point. Grapes thus packed will keep 9 or even 12 months. To restore them to their freshness, cut the end of the stalk of each bunch of grapes, and put that of white grapes into white wine, and that of black grapes into red wine, as flowers are put into water to revive or to keep them fresh.—*Monthly Mag.*

To pack young trees for exportation.

The long white moss of the marshes, sphagnum palustre, may be applied for this purpose. Squeeze out part of the moisture, from the moss, and lay courses of it about three inches thick, interposed with other courses of the trees, shortened in their branches and roots, stratum above stratum, till the box is filled; then let the whole be trodden down, and the lid properly secured. The trees will want no care, even during a voyage of 10 or 12 months, the moss being retentive of moisture, and appearing to possess an antiseptic property, which prevents fermentation or putrefaction. Vegetation will proceed, during the time the trees remain inclosed, shoots arising both from the branches and roots, which, however, are blanched and tender, for want of light and air, to which the trees require to be gradually inured. This moss is very common in most parts of Europe and America.

Practical directions to gardeners.

1. Perform every operation in the proper season.

2. Perform every operation in the best manner.

This is to be acquired in part by practice, and partly also by reflection. For example, in digging over a piece of ground, it is a common practice with slovens to throw the weeds and stones on the dug ground, or on the adjoining alley or walk with the intention of gathering them off afterwards. A better way is to have a wheel-barrow, or a large basket, in which to put the weeds and extraneous matters, as they are picked out of the ground. Some persons, in planting or weeding, whether in the open air, or in hot houses, throw down all seeds, stones, and extraneous matter on the paths or alleys, with a view to pick them up, or sweep or rake them together afterwards: it is better to carry a basket or other utensil, either common or subdivided, in which to hold in one part the plants to be planted, in another the extraneous matters, &c.

3. Complete every part of an operation as you proceed.

4. Finish one job before beginning another.

5. In leaving off working at any job, leave the work and tools in an orderly manner.

6. In leaving off work for the day, make a temporary finish, and carry the tools to the tool-house.

7. In passing to and from the work, or on any occasion, through any part of what is considered under the charge of the gardener, keep a vigilant look out for weeds, decayed leaves, or any other deformity, and remove them.

8. In gathering a crop, remove at the same time the roots, leaves, stems, or whatever else is of no farther use, or may appear slovenly, decaying or offensive.

9. Let no crop of fruit, or herbaceous vegetable, go to waste on the spot.

10. Cut down the flour stalks of all plants.

11. Keep every part of what is under your care perfect in its kind.

Attend in spring and autumn to walls and buildings, and get them repaired, jointed, glazed, and painted where wanted. Attend at all times to machines, implements, and tools, keeping them clean, sharp, and in perfect repair. See particularly that they are placed in their proper situations in the tool-house. House every implement, utensil, or machine not in use, both in winter and summer. Allow no blanks in edgings, rows, single specimens, drills, beds, and even where practicable, in broad-cast sown pieces. Keep edgings and edges cut to the utmost nicety. Keep the shapes of the wall trees filled with wood according to their kind, and let their training be in the first style of perfection. Keep all walks in perfect form, whether raised or flat, free from weeds, dry, and well rolled. Keep all the lawns, by every means in your power, of a close texture, and dark green velvet appearance. Keep water clear and free from weeds, and let not ponds, lakes, or artificial rivers, rise to the brim in winter, nor sink very far under it in summer.

HUSBANDRY.

Component parts of soil.

In general the component parts in the soil, whatever may be the colour, are argill, sand, water, and air; for into these original principles may all earths be reduced, however blended with apparently foreign substances. Argill is the soft and unctuous part of clay. The primitive earths, argill and sand, contain each, perhaps in nearly equal degrees, the food of plants; but in their union the purposes of vegetation are most completely answered. The precise quantities of each neccessary to make this union perfect, and whether they ought to be equal, it is neither very easy nor very material to ascertain, since that point is best determined in practice, when the soil proves to be neither too stiff or adhesive, from the superabundance of clay, nor of too loose and weak a texture, from an over quantity of sand in its composition. The medium is undoubtedly best; but an excess towards adhesion is obviously most safe. A stiff or strong soil holds the water which falls upon it for a long time, and, being capable of much ploughing, is naturally well qualified for carrying the most valuable arable crops. A light sod, or one of a texture feeble and easy broken, is, on the contrary, soon exhausted by aration, and requires renovation by grass; or otherwise it cannot be cultivated to advantage.

To distinguish clayey soils.

A clayey soil, though distinguished by the colour which it bears, namely, black, white, yellow, and red, differs from all other soils, being tough, wet, and cold, and consequently requiring a good deal of labour from the husbandman before it can be sufficiently pulverized, or placed in a state for bearing artificial crops of corn or grass. Clay land is known by the following qualities, or properties. It holds water like a cup, and once wetted does not soon dry. In like manner, when thoroughly dry, it is not soon wetted; if we except the varieties which have a thin surface, and are the worst of all to manage. In a dry summer, clay cracks, and shews a surface full of small chinks, or openings. If ploughed in a wet state, it sticks to the plough like mortar, and in a dry summer the plough turns it up in great clods, scarcely to be broken or separated by the heaviest roller.

To manage sandy soils.

Soils of this description are managed with infinitely less trouble, and at an expense greatly inferior to what clays require; but at the same time, the crops produced from them are generally of smaller value. There are many varieties of sand, however, as well as of clay; and in some parts of the island, the surface is a little better than a bare barren sand, wherein artificial plants will not take root, unless a dose of clay or good earth is previously administered. This is not the soil meant by the farmer when he speaks of sands. To speak practically, the soil meant is one where sand is predominant, although there be several other earths in the mixture. From containing a great quantity of sand, these soils are all loose and crumbling, and never get into a clod, even in the driest weather. This is the great article of distinction betwixt sands and sandy loams. A sandy loam, owing to the clay that is in it, does not crumble down, or become loose like a real sand, but retains a degree of adhesion after wetness or drought, notwithstanding the quantity of sand that is mixed with it. Perhaps a true sandy loam, incumbent upon a sound subsoil, is the most valuable of all soils. Upon such, every kind of grain may be raised with advantage, and no soil is better calculated for turnips and grass.

The real sands are not favourable to the growth of wheat, unless when preceded by clover, which binds the surface, and confers a temporary strength for sustaining that grain. Much of the county of Norfolk is of this description; and it is well known that few districts of the kingdom yield a greater quantity of produce. Till Norfolk, however, was invigorated by clay and marl, nearly one half of it was little better than waste; but by the success which accompanied the use of these auxiliaries, a new soil was in a manner created; which, by a continuation of judicious management, has given a degree of fame to the husbandry of that county, far surpassing that of other districts naturally more fertile.

Gravelly soils.

The open porous nature of these soils disposes them to imbibe moisture, and to part with it with great facility: from the latter of which circumstances they are subject to burn, as it is termed, in dry seasons. The main difference between gravel and sand is, that the former is chiefly composed of small soft stones; though, in some instances, the stones are of a silicious or flinty nature, and, in others, of the calcareous and chalky. From these constitutional circumstances arise the propriety of deepening gravelly soils by coats of marl or earth, and of keeping them fresh by frequent returns of grass, and repeated applications of manure. Gravelly soils, from the lightness of their texture, are not expensive or difficult in the means of cultivation. All the necessary business required for gravels may be carried forward with ease and expedition; and such soils are, in general, soon brought into a proper state for the reception of crops.

The constitutional qualities of gravels point out the propriety of ploughing them deep, so that the surface soil may be augmented, and greater room given to the growth of the plants cultivated on them. A shallow-ploughed gravel can stand no excess of weather, however enriched by manure. It is burnt up by a day or two of drought, and it is almost equally injured by an excessive fall of rain, unless the pan or firm bottom, which such soils easily gain, be frequently broken through by deep ploughing.

Uses of different soils.

Clayey soils, when sufficiently enriched with manures, are naturally well qualified for carrying crops of wheat, oats, beans, and clover; but are not fitted for barley, turnips, potatoes, &c. or even for being kept under for grass longer than one year. Such soils ought to be regularly summer-fallowed once in six, or at least once in eight years, even when they are comparatively in a clean state, as they contract a sourness and adhesion from wet ploughing, only to be removed by exposure to the sun and wind during the dry months of summer. Soils of this kind receive little benefit from winter ploughing, unless so far as their surface is thereby presented to the frost, which mellows and reduces them in a manner infinitely superior to what could be accomplished by all the operations of man. Still they are not cleaned or made free of weeds by winter ploughing; and therefore this operation can only be considered as a good means for procuring a seed-bed, in which the seeds of the future crop may be safely deposited. Hence the necessity of cleaning clay soils during the summer months, and of having always a large part of every clay farm under summer fallow. All clayey soils require great industry and care, as well as a considerable portion of knowledge in the dressing or management, to keep them in good condition; yet when their natural toughness is got the better of, they always yield the heaviest and most abundant crops. One thing requisite for a clayey soil, is to keep it rich and full of manure; a poor clay being the most ungrateful of all soils, and hardly capable of repaying the expense of labour, after being worn out and exhausted. A clayey soil also receives, comparatively, small benefit for grass; and when once allowed to get into a sterile condition, the most active endeavours will with difficulty restore fertility to it, after the lapse of many years.

Upon light soils, the case is very different. These flourish under the grass husbandry; and bare summer fallow is rarely required, because they may be cleaned and cropped in the same year, with that valuable esculent, turnip. Upon light soils, however, wheat can seldom be extensively cultivated; nor can a crop be obtained of equal value, either in respect of quantity or quality, as on clay sand loams. The best method of procuring wheats on light lands, is to sow upon a clover stubble, when the soil has got an artificial solidity of body, and is thereby rendered capable of sustaining this grain till it arrives at maturity. The same observation applies to soils of a gravelly nature; and upon both, barley is generally found of as great benefit as wheat.

Thin clays, and peat earths, are more friendly to the growth of oats than of other grains, though in favourable seasons a heavy crop of wheat may be obtained from a thin clayey soil, when it has been completely summer-fallowed, and enriched with dung. A first application of calcareous manure is generally accompanied with great advantage upon these soils; but when once the effect of this application is over, it can hardly be repeated a second time, unless the land has been very cautiously managed after the first dressing. Neither of these soils is friendly to grass, yet there is a necessity of exercising this husbandry with them, because they are incapable of standing the plough more than a year or two in the course of a rotation.

Wheat ought to be the predominant crop upon all the rich clays and strong loams, and that light soils of every kind are well qualified for turnips, barley, &c. Upon the thin and moorish soils, oats must necessarily preserve a prominent rank; and grass seeds may be cultivated upon every one of them, though with different degrees of advantage, according to the natural and artificial richness of each soil, or to the qualities which it possesses for encouraging the growth of clover, in the first instance, and preserving the roots of the plant afterwards.

Operation of tillage.

Tillage is an operation whereby the soil is either cleared from noxious weeds, or prepared for receiving the seeds of plants cultivated by the husbandman. When this operation is neglected, or even partially executed, the soil becomes foul, barren, and unproductive; hence, upon arable farms, tillage forms the prominent branch of work; and, according to the perfection or imperfection, with which it is executed, the crops of the husbandman, whether of corn or grass, are in a great measure regulated.

Tillage, in the early ages, was performed by hand labour; but, in modern times, the plough has been the universal instrument used for executing this necessary and important branch of rural work. In no other way can large fields be turned over, because the expense of digging with the spade, the only other method of turning over the ground, would much exceed any profit that can be reaped.

Stones lying above or below the surface are the most formidable obstruction to perfect tillage. On stony ground, the work is not only imperfectly executed, but in many cases the implement is broken to pieces, and a considerable portion of time lost before it is repaired, and put in order. The removal of stones, therefore, especially of such as are below the surface, ought to be a primary object with every agriculturist; because a neglect of this kind may afterwards occasion him considerable loss and inconvenience.

To drain the ground, in other words, to lay it dry, also facilitates tillage exceedingly; for ploughing cannot be performed with advantage where either the surface or subsoil is wet.

Best mode of tillage.

The only sure and certain way by which the soil is cleaned or rendered free of weeds, is by ploughing in the summer months, when the ground is dry, and when, by the influence of the sun and air, the weeds may be destroyed with facility. Seldom at any other period is the soil much benefited by ploughing, unless so far as a seed-bed is thus procured for the succeeding crop; and though the situation or state of the ground, when these intermediate ploughings are bestowed, is of importance in judging of their utility, yet the radical process of summer fallow cannot, by any means, be altogether dispensed with. Though, if the winter and spring ploughings are executed under favourable circumstances, and plenty of manure is at hand, it may be delayed for a greater number of years than is otherwise practicable, if good husbandry is to be maintained.

Without summer fallow, or, which is the same thing, without working the ground in the summer months, perfect husbandry is unattainable on all heavy or cold soils, and upon every variety incumbent on a close or retentive bottom.

To keep his land clean will always be a principal object with every good farmer; for, if this is neglected, in place of carrying rich crops of corn or grass, the ground will be exhausted by crops of weeds. Where land is foul, every operation of husbandry must be proportionably non-effective; and even the manures applied will, in a great measure, be lost.

The necessity of summer fallow depends greatly upon the nature and quality of the soil; as, upon some soils, a repetition of this practice is less frequently required than upon others. Wherever the soil is incumbent upon clay or till, it is more disposed to get foul, than when incumbent upon a dry gravelly bottom; besides, wet soils, from being ploughed in winter, contract a stiffness which lessens the pasture of artificial plants, and prevents them from receiving sufficient nourishment. When land of a dry gravelly bottom gets foul, it may easily be cleaned without a plain summer fallow; since crops, such as turnips, &c. may be substituted in its place, which, when drilled at proper intervals, admit of being ploughed as often as necessary; whereas wet soils, which are naturally unfit for carrying such crops, must be cleaned and brought into good order, by frequent ploughings and harrowings, during the summer months.

To conduct a fallow.

Upon all clayey soils (and upon such only is a complete summer fallow necessary), the first ploughing ought to be given during the winter months, or as early in the spring as possible; which greatly promotes the rotting of the sward and stubble. This should be done by gathering up the ridge, which both lays the ground dry, and rips up the furrows. As soon as seed time is over, the ridge should be cloven down, preparatory to cross ploughing; and after lying a proper time, should be harrowed and rolled repeatedly, and every particle of quickens that the harrows have brought above, should be carefully picked off with the hand. It is then proper to ridge or gather it up immediately, which both lays the land in proper condition for meeting bad weather, and opens up any fast land that may have been missed in the furrows when the cross ploughing was given. After this, harrow, roll, and gather the root weeds again; and continue so doing till the field is perfectly clean.

To prepare the ground.

The above object is most completely accomplished, when the ground is ploughed deep and equal, while the bottom of the furrow immediately above the subsoil is perfectly loosened, and turned equally over with the part which constitutes the surface. In many places, these properties are altogether neglected, the ground being ploughed in a shallow way, while the bottom of the ploughed land remains something like the teeth of a saw, having the under part of the furrow untouched, and consequently not removed by the action of the plough. While these things are suffered, the object of tillage is only partially gained. The food of plants can only be imperfectly procured; and the ground is drenched and injured by wetness; these ridges, or pieces of land, which are not cut, preventing a descent of the moisture from above to the open furrows left for carrying it off. Where the seed-bed is prepared by one ploughing, the greatest care ought to be used in having it closely and equally performed. When two are given, they should be in opposite directions, so that any firm land left in the first may be cut up in the second ploughing. It is not profitable to plough twice one way, if it can be safely avoided.

Another important point towards procuring good tillage, is never to plough the land when in a wet state; because encouragement is thus given to the growth of weeds, while a sourness and adhesion is communicated to the ground, which is rarely got the better of till the operations of a summer fallow are again repeated.

All soils ought not to be wrought, or ploughed, in one manner. Each kind has its particular and appropriate qualities: and therefore, each requires a particular and appropriate mode of tillage. Ploughing, which is the capital operation of husbandry, ought, on these accounts, to be administered according to the nature of the soil which is to be operated upon, and not executed agreeably to one fixed and determined principle. On strong clays and loams, and on rich gravels and deep sands, the plough ought to go as deep as the cattle are able to work it; whereas, on thin clays and barren sands, the benefit of deep ploughing is very questionable, especially when such are incumbent on a till bottom, or where the subsoil is of a yellow-ochre nature; such, when turned up, being little better than poison to the surface, unless highly impregnated with alluvial compost, the effect of which expels the poisonous substance contained in this kind of subsoil, and gives a fertility to the whole mass, more decisively permanent, than would follow a heavy application of the best rotten dung.

Two sets of ploughs required for perfect tillage.

On clayey soils, where the ridges must be considered acclivated, so that the ground may be preserved in something like a dry condition, the plough, used for tillage, ought to have a mould-board considerably wider set than is required for light soils, in order that the furrow may be close cut below, and duly turned over. This method of constructing the plough necessarily makes a heavier draught than would be the case were the mould-board placed differently, though if good and sufficient work be wanted, the necessity of constructing the implement in the way mentioned, is absolute and indispensable. The plough to be used on light soils, or on all soils that admit of what is technically called crown and furrow ploughing, may be made much straighter below, and yet be capable of executing the work in a perfect manner. On every farm, consisting of mixed soils, two sets of ploughs ought to be kept, otherwise proper work cannot be performed. All land ought to be ploughed with a shoulder, and the advantages of ploughing in this way are, that, if ploughed before winter, the surface is enabled to resist the winter rains, and afterwards present a face, on which the harrows can make a proper impression, when the seed process is to be executed. This deserves particular attention when old grass fields are broken up; as, by neglecting it, the harrows often are unable to cover the seed. It is perfectly practicable to plough land with a tolerably broad furrow, say 10, 11, or 12 inches, and yet to plough it clean, provided the implement used is properly constructed; but, then, care must be taken that the furrow be of proportionate deepness, otherwise it will be laid on its back, instead of being deposited at an angle proper for undergoing the harrowing process.

Implements of husbandry.

No country in the world is better provided with implements for executing rural labour than Great Britain; and to this superiority may, in some measure, be attributed the increased and increasing perfection of agriculture over the whole island. We have ploughs of all the different kinds that ever were constructed: as for wheel carriages, the variety is immense; whilst harrows, and other common implements, of various constructions and dimensions, are equally numerous. But it is in the articles more properly allied to machinery, that the superiority of British rural implements is most conspicuous. Drills, for sowing grain and small seeds with regularity have been constructed upon scientific principles; and machines, for separating grain from straw, have been invented, and brought to a degree of perfection which few people expected, when these machines were first introduced.

Mr. Small's improved Rotherham plough.

The sock, or share, is made with a fin, or feather, whereby the firm earth at the bottom of the furrow is cut more completely than was practicable by the sock of the old ploughs, which acted more in the way of mining and forcing, than cutting and removing the earth with facility or ease; and the mould-board being of cast metal, may be set wider or closer according to the nature of the soil on which the plough is to be used, or the height of the ridges that are to be ploughed. This implement is, therefore, the best constructed swing plough in the island; and by means of it a man and two horses will, with all ease, plough an English acre per day, except in particular seasons, when the soil, from drought, has become hard and obstinate.

No kind of plough will cut the furrow so clean, or turn it so nicely over for receiving benefit from the atmosphere, and effect from the harrowing process; and, what is of greater importance, none are more easily drawn, taking into account the quality of work that is performed, than the one of which we are now speaking. A great deal of its utility is determined by the strength of the animals employed in the draught; by the dexterity of the man to whom the management is committed: and by the order and condition in which the coulter and share are preserved; for the best constructed implement will make bad work, when strength and dexterity are wanting in the operator. But, under a parity of circumstances, it may be affirmed, that the swing plough, brought into practice, and afterwards improved by Mr. Small, is fitted for executing work to a better purpose, than any other of the numerous varieties of that implement employed in the several districts of Great Britain.

The mould-board, as the sheath, or head, is now generally made of cast-iron.

It is now universal over Scotland, and, perhaps, were it better known in England, it might come to displace the complicated ploughs, with wheels, and other trumpery, with which agriculture there is at present encumbered; as it is not apt to be put out of order, but, simple in the construction, and effective in operation, it is adapted to almost every situation. The chain, connected with the muzzle, by which it is drawn, fixed as far back as the coulter, is not essential to its formation, serving merely to strengthen the beam, which may be made stronger of itself at less expense, while the tillage is as accurately performed with ploughs that have none. The price is from 50*s*. to 60*s*.

Veitch's improved plough.

Mr. James Veitch, of Inchbonny, near Jedburgh, an ingenious artizan, has made very considerable improvements on the plough, of which he gives the following account:—"It is well known to every practical farmer, that land when properly ploughed, must be removed from a horizontal position, and twisted over to a certain angle, so that it may be left in that inclining state, one furrow leaning upon another, till the whole field be completely ploughed. The depth and width of the furrow which is most approved of by farmers, and commonly to be met with in the best ploughed fields, are in the proportion of two to three, or if the furrow be two feet deep, it must be three wide, and left in an inclining position from 45 deg. to 46 deg.

"Mr. Small's plough is by far the best known in this country, but the perpendicular position of the sheath, and the two sudden twist of the sock and mould-board, together with the mould-board not being a proper curve with respect to the different resistance that the sock and mould-board will meet with in ploughing stiff land, render it, in many respects, not so perfect an instrument as could be wished for. As the sock and fore part of the mould-board, entering first into the stiff land, meet with the greatest resistance, and consequently must wear soonest, to remedy this I begin at the point of the sock, and bring it a great way farther forward than that of Small's, and by this means give it a more oblique position; which diminishes the angle of the furrow's ascension from the horizontal to the vertical position. The more this angle is diminished, where it meets with the greatest resistance, the less apt will the plough be to tilt out of the land; and the nearer to the perpendicular the sheath and sock are with respect to the sole of the plough, the less hold will it take of the land, and it will be more apt to start out. If the point of the sock be not made to project a great way below the plane of the sole, or point downwards toward the bottom of the furrow, the ploughs that are make in this fashion grind away the point of the sock below: and, as this point is so much inclined, and removed from a parallel position with respect to the sole of the plough, it increases the friction to that part, and makes the plough a great deal more difficult to draw. This parallel position I have preserved in my plough, as far as the strength of cast-iron will admit; and as the furrows are laid parallel on one another, I have formed the sock, and that part of the mould-board, (where the furrow, by twisting over, is brought to the perpendicular,) by cutting away the mould-board pattern, in parallel lines, from the sole of the plough to the top of the mould-board; and, by these means, I both procure a steadier motion for the plough, and also diminish the friction, by diminishing the angle; and consequently render it easier drawn, and less apt to break the furrow.

"In the framing of this plough I have proportioned one part to another, so that all parts of it may wear alike; the iron work is fixed on the plough simply, and at the same time perfectly secure. I have likewise made a spring steel-yard, to determine the difference of draught between Small's plough, and the one which I have constructed."

Plough for cleaning beans and turnips.

Besides the improved Rotheram plough, now in general use, and worked by two horses, another implement constructed upon the same principles, but of smaller dimensions, and considerably lighter, is used for cleaning beans, potatoes and turnips. This plough, wrought by one horse, does the business completely. It is of advantage to put a piece of plate iron between the coulter and sheath or head, that the loose earth may not fall through upon the young plants. A horse-shoe, called a scraper, is also used to clean drilled crops on light soils, and is very efficacious when annual weeds are to be destroyed; but when quicken or other root weeds are in the ground, a deeper furrow is required, and in that case the light Rotheram furrow becomes necessary.

The universal sowing machine.

This machine whether made to be worked by hand, drawn by a horse, or fixed to a plough, and used with it, is extremely simple in the construction, and not liable to be put out of order: as there is but one movement to to direct the whole. It will sow wheat, barley, oats, clover, coleseed, hemp, flax, canary, rape, turnip; besides a great variety of other kinds of grain and seeds, broad-cast, with an accuracy hitherto unknown. It is equally useful when fixed to a plough; it will then drill a more extensive variety of grain, pulse, and seed, (through every gradation, with regard to quality,) and deliver each kind with greater regularity, than any drill plough whatever.

Among many other valuable and peculiar properties, it will not only sow in the broadcast way, with a most singular exactness, but save the expense of a seeds-man; the seed being sown (either over or under furrow at pleasure,) and the land ploughed at the same operation.

Another advantage attending the use of this machine is, that the wind can have no effect on the falling of the seed.

The machine when made to be used without a plough, and to be drawn by a horse, may be of different lengths. The upper part contains the hoppers, from which the grain or seed descends into the spouts. The several spouts all rest upon a bar, which hangs and plays freely by two diagonal supporters; a trigger, fixed to this bar, bears a catch wheel: this being fixed on the axle, occasions a regular and continual motion, or jogging of the spouts, quicker or slower in proportion to the space the person sowing with it drives. At the bottom of the machine is placed an apron or shelf, in a sloping position, and the corn or seed, by falling thereon from the spouts above, is scattered about in every direction.

To sow the corn or seeds in drills, there are moveable spouts, which are fixed on, or taken off at pleasure, to direct the seed from the upper spout to the bottom of the furrow.

Harrows.

These beneficial implements are of various sizes and dimensions; but the harrow most commonly used consists of four bulls, with cross-mortised sheaths, each bull containing five teeth, or from five to seven inches in length below the bulls, the longest being placed forwards. Harrows of this kind, drawn by one horse, are generally used on most farms for all purposes, though on others large brake-harrows, consisting of five bulls, each containing six teeth, and worked by two horses, are employed during the fallow process, and for reducing rough land. Some of these brake-harrows are constructed with joints, so as to bend and accommodate their shape to the curvature of ridges. A small harrow, with short teeth, is also used for covering grass seeds, though we have rarely seen any detriment from putting grass seeds as deep into the ground as the teeth of ordinary sized harrows are capable of going.

The best methods of harrowing.

When employed to reduce a strong obdurate soil, not more than two harrrows should be yoked together, because they are apt to ride and tumble upon each other, and thus impede the work, and execute it imperfectly. On rough soils, harrows ought to be driven as fast as the horses can walk; because their effect is in direct proportion to the degree of velocity with which they are driven. In ordinary cases, and in every case, where harrowing is meant for covering the seed, three harrows are the best yoke, because they fill up the ground more effectually, and leave fewer vacancies, than when a smaller number is employed. The harrow-man's attention, at the seed process, should be constantly directed to prevent these implements from riding upon each other, and to keep them clear of every impediment from stones, lumps of earth, or clods, and quickens or grass roots; for any of these prevents the implement from working with perfection, and causes a mark or trail upon the surface, always unpleasing to the eye, and generally detrimental to the braird or vegetation of the seed. Harrowing is usually given in different directions, first in length, then across, and finally in length as at first. Careful husbandmen study, in the finishing part of the process, to have the harrows drawn in a straight line, without suffering the horses to go in a zig zag manner, and are also attentive that the horses enter fairly upon the ridge, without making a curve at the outset. In some instances, an excess or harrowing has been found very prejudicial to the succeeding crop; but it is always necessary to give so much as to break the furrow, and level the surface, otherwise the operation is imperfectly performed.

Rollers.

The roller is an implement frequently used for smoothing the surface of land when in tillage, especially when the processes of summer fallow are going forward. Several kinds of rollers are used in Britain. Some are made of stone, others of wood, according to the nature of the operation intended to be performed. The only material difference in rollers is their weight; but it should be attended to, when a roller is made of large diameter, that its weight ought to be the greater; for in proportion to the largeness of its diameter, will be the extent of surface upon which the roller rests. The weight of a roller ought therefore to be in proportion to its diameter, otherwise its effect will be proportionably diminished.

Rolling, however, is a modern improvement, and used for different purposes. In the first place, it is of great advantage to roll young grasses after the ground is stoned, because the scythe can then be placed nearer the surface, and the crop cut more equally than when the operation is neglected. 2dly, Land on which turnips are to be cultivated can rarely be made fine enough, without the repeated use of this implement. And, 3dly, The process of summer fallow, upon strong soils, is much advanced by rolling, because, without its aid, the large and obdurate clods cannot be reduced, or couch-grass eradicated. From these circumstances it will readily appear, that rollers of various sizes and dimensions are required on every farm, for accomplishing different purposes. Wooden rollers, drawn by one horse, answer very well for grass and turnip land; but massy stone rollers, drawn either by two or three horses, are absolutely necessary on clay soils.

It is obvious, that when a large field is to be rolled, a number of rollers ought at once to be set at work, otherwise an opportunity may be lost, never to be regained. The deficiency is most conspicuous, when barley is taken after turnips in a dry season. From poaching the ground with carts, in order to carry off the crop, and even by the treading of sheep, a degree of stiffness is contracted, which requires the use of the roller before grass seeds can be sown.

On all occasions it is most beneficial to roll across, because, when going in length, the implement is of small benefit to the furrows, the slightest acclivation of the ridges preventing the work from being equally performed. The expedition which takes place when rollers are used, compared with the tedious and expensive process of breaking clods with malls, formerly the general custom, sufficiently proves the importance of these implements, though it deserves to be remarked, that, when rolling is bestowed upon a spring-sown field, harrowing it afterwards is of great advantage. By harrowing when the clods are reduced, the earth stands the effects of rain better afterwards, and does not consolidate so firmly as when that process is neglected.

The thrashing machine.

The thrashing machine is the most valuable implement in the farmer's possession, and one which adds more to the general produce of the country, than any invention hitherto devised. The saving of manual labour, thereby obtained, is almost incalculable; while the work is performed in a much more perfect manner than was formerly practicable, even when the utmost care and exertion were bestowed. In fact, had not the thrashing machine been invented, it is hardly possible to conceive what would have been the rate or expense of thrashing, or even whether a sufficient number of hands could, at any rate of expense, have been obtained for thrashing the grain of the country.

Since the erection of this machine, Mr. Meikle has progressively introduced a variety of improvements, all tending to simplify the labour, and to augment the quantity of the work performed. When first erected, though the corn was equally well separated from the straw, yet as the whole of the straw, chaff, and corn, were indiscriminately thrown into a confused heap, the work could only, with propriety, be considered as half executed. By the addition of rakes, or shakers, and two pair of fanners, all driven by the same machinery, the different processes of thrashing, shaking, and winnowing, are now all at once peformed, and the corn immediately prepared for the public market. When it is added, that the quantity of corn gained from the superior powers of the machine is fully equal to a twentieth part of the crop, and that, in some cases, the expense of thrashing and cleansing the corn is considerably less than what was formerly paid for cleaning it alone, the immense savings arising from the invention will at once be seen.

The expense of horse labour, from the increased value of the animal, and the charge of his keeping, being an object of great importance, it is recommended that, upon all sizeable farms, that is to say, where two hundred acres, or upwards, of corn are sown, the machine should be wrought by wind, unless where local circumstances afford the conveniency of water.

Where coals are plenty and cheap, steam may be advantageously used for working the machine. A respectable farmer, in the county of East Lothian, works his machine in this way; and, being situated in the neighbourhood of a colliery, he is enabled to thrash his grain at a trifling expense.

Method of treading corn in Virginia.

In Virginia and other countries wheat is trodden out by horses, nearly in the same way as it was formerly done in Palestine by oxen.

The treading floors are generally from 60 to 100 feet diameter; but the larger their diameter is, so much easier is the work to the horses. The track or path, on which the sheaves are laid, and on which the horses walk, is from 12 to 24 feet wide, or more. The floors are commonly enclosed by fences; and the horses are generally driven between them promiscuously and loose, each pressing to be foremost, so that fresh air may be obtained,—biting, jostling, and kicking each other with the greatest fury. The labour in this way is extremely severe. Upon some small floors a centre-stick is placed, to which hangs a rope, or a pole or a pole and swivel, and four or five horses being fastened together, travel round upon the sheaves with the utmost regularity. Previous to laying down the wheat sheaves, the state of the air, and the probability of its continuing dry through the day, is fully considered. If they resolve to tread, the morning is suffered to pass away till the dew is removed. A row of sheaves is first laid upon the floors with the heads and butts in a line across the tract of it, as a bolster for receiving other sheaves; and these sheaves range with the path, or circle, the butts resting on the floor. Other sheaves are ranged in like manner, with the heads raised on the former, till the whole floor is filled, when it appears to be filled with nothing but ears of wheat, sloping a little upwards. Upon laying down each sheaf, the band thereof is cut with a knife. A west wind is always desirable while treading is going on, as when wind is from the eastward, dampness generally prevails.

In some instances, twenty-four horses are formed at some distance from the floor into four ranks; and when the floor is ready laid, the word is given to advance. For the sake of order and regular work, a boy mounted on one of the foremost horses advances in a walk with the whole rank haltered or tied together, and enters upon the bed of wheat, walking the horses slowly over it; another rank is ordered to follow as soon as the first is supposed to have obtained a distance equal to a fourth part of the circumference of the bed, and in the same manner the other ranks proceed. They are forbidden to go past a walk, till they have proceeded 5 or 6 rounds, when the word is given to move at a sober trot, and to keep their ranks at a full distance from each other, regularity and deliberate movement being necessary for preventing confusion. The gentle trot is continued till it may be supposed the horses have travelled 8 or 9 miles, which is the extent of their first journey; they are then led off to be foddered and watered, when the trodden light straw is taken off as deep as the place where the sheaves lie close, and are but partially bruised.

As soon as this first straw is removed, one-third of the width of the bed is turned over on the other two-thirds from the inner side or circle of the bed, which narrows the neck of the next journey. The horses are again led on, and trot out their second journey, till the straw be clear of wheat. The outer part of the bed is then turned upon the middle part, when the horses take another journey. The loose straw being then taken off, the whole remaining bed is turned up from the floor, and shaken with forks, and handles of rakes, after which the horses give another tread, which finishes the work. The grain is then shoved up from the floor with the heads of rakes turned downwards, and put into heaps of a conical form, in which situation it often remains exposed to the weather for several days. The correct American agriculturists, however, have houses adjoining to the treading floor, where the grain is deposited till it is cleared from the chaff and offal; though as most of them continue treading if the weather be favourable, till the whole crop is separated from the straw, it is pretty obvious that the grain stands a considerable chance of being damaged before the several processes are concluded.

Fanners.

If thrashing machines are of much advantage to the public, by separating corn completely from the straw, the introduction of fanners, or the machine by which corn is cleaned from chaff, and all sorts of offal, may, with justice, be considered as proportionally of equal benefit to the practical agriculturist.

Since thrashing machines were introduced, fanners almost in every case are annexed to them, and in some instances, where powerful machines are used, fitted internally with suitable riddles, it is perfectly practicable to measure and market the grain immediately as it comes from the machine.

Manures.

The term manure is applied indiscriminately to all substances, which are known from experience either to enrich the different soils, or contribute in any other way to render them more favourable to vegetation.

In an agricultural point of view, the subject of manures is of the first magnitude. To correct what is hurtful to vegetation in the different soils, and to restore what is lost by exhausting crops, are operations in agriculture which may be compared to the curing of diseases in the animal body, or supplying the waste occasioned by labour.

To manage dung upon light lands.

For soils of this description, where turnips are taken as a first crop, dung can hardly be too well prepared; because the nature of the crop, to which it is applied, renders a complete incorporation with the ground absolutely necessary; without which the young plants might be starved at their very entrance into life. In the best farmed English counties, dung is often kept more than a year, in order that it may be perfectly rotted.

In general there is not much difficulty in preparing dung upon turnip farms; because, in the driest season, from the nature of the food used, such a quantity of liquid passes from the animals, as to prevent burning, provincially *fire-fanging*, the greatest obstacle to the rotting of dung that can be experienced. If turnip dung is regularly removed, if it is properly mixed with the horse litter, and other excrementitious matter accumulated upon the farm, it will be found an easy task to prepare all that is made by the middle of April, at which time the fold-yard should be cleared. What is produced after that time should be stored up separately, receive waterings if the weather is dry, and be reserved for clover-stubbles, or other fields that are to be dunged in autumn.

The middle of April is a good time for clearing the fold-yard; but this does not prevent the work from going partially forward through the winter, when suitable opportunities occur.

When driven out of the fold-yard, the dung should be laid up in a regular heap or pile, not exceeding six quarters, or four feet and an half in height; and care should be taken not to put either horse or cart upon it, which is easily avoided, by backing the cart to the pile, and laying the dung compactly together with a grape or fork. It is also useful to face up the extremities with earth, which keeps in the moisture, and prevents the sun and wind from doing injury. Perhaps a small quantity of earth strewed upon the top might also prove useful. Dung, when managed in this manner, generally ferments very rapidly; but if it is discovered to be in a backward state, a complete turn over, about the 1st of May, when the weather becomes warm, will quicken the process; and the better it is shaken asunder, the sooner will the object in view be accomplished.

A secluded spot of ground, not much exposed to wind, and perfectly secure from being floated with water, ought always to be chosen for the site of such piles or heaps. If the field to which it is to be applied is at hand, a little after-trouble may be saved, by depositing it there in the first instance. But it is found most convenient to reserve a piece of ground adjacent to the homestead for this purpose. There it is always under the farmer's eye, and a greater quantity can be moved in a shorter time than when the situation is more distant. Besides, in wet weather, (and this is generally the time chosen for such an operation) the roads are not only cut up by driving to a distance, but the field on which the heap is made, may be poached and injured considerably.

Upon heavy lands.

Upon clay soils, where wheat forms a principal part of the crop, where great quantities of beans are cultivated, and few turnips sown, unless for the use of milch cows, the rotting of dung is not only a troublesome but an expensive affair. Independent of what is consumed by the ordinary farm stock, the overplus of the straw must, somehow or other, be rotted, by lean cattle kept in the fold-yard, who either receive the straw in racks, or have it thrown across the yard, to be eaten and trodden down by them. According to this mode of consumption, it is evident that a still greater necessity arises for a frequent removal of this unmade dung, otherwise, from the trampling of beasts, and the usual want of moisture, it would compress so much as altogether to prevent putrefaction. To prepare dung sufficiently upon farms of this description, is at all times an arduous task, but scarcely practicable in dry seasons; for if it once gets burnt, (*fire-fanged*) it is almost physically impossible to bring it into a suitable state of preparation afterwards; and, at all events, its virtues are thereby considerably diminished.

Straw flung out in considerable portions to the fold-yard, after being compressed by the trampling of cattle, becomes rather like a well-packed stack, than a mass of dung in a preparatory state. The small quantity of water and dung made by the animals is barely sufficient to cause a slight fermentation; and this slight fermentation, when the heap gets into a compressed state, is sure to bring on *fire-fang*, as already said; after which its original powers can rarely be restored. To prevent such an injury, no measure can be so successfully used, as a frequent removal of this unmade dung, especially if the weather is wet at the time. If people can stand out to work, there cannot be too much wetness when executing this operation; for there is always such a quantity of the straw that has not passed through the entrails of the cattle, as renders it almost impossible to do injury, in the first instance, by an excess of moisture.

It is therefore recommended, upon every clay-land farm, especially those of considerable size, that the fold-yard be frequently cleared, and that the greatest care be taken to mix the stable or horse-dung in a regular way with what is gathered in the fold-yard, or made by other animals, in order that a gradual heat or fermentation may be speedily produced. Where the materials are of the sorts now described, (that is, a small quantity of dung, or excrementitious matter, and a large store of unrotten straw, only partially moistened), no damage can ensue from putting horses and carts upon the heap; nay, a positive benefit will be gained from this slight compression.

The heap or pile, in the case of turnip dung, should be formed in a secluded spot, if such can be got at hand; because the less it is exposed to the influence of the sun and wind, so much faster will fermentation proceed. It should be constructed on a broad basis, which lessens the bounds of the extremities; and several separate heaps are necessary so that too much may not be deposited at once. By shifting the scene frequently, and allowing each covering or coat to settle and ferment, before laying on any more, the most happy effects will follow, and these heaps (at least all such as are completed before the first of May), may reasonably be expected to be in a fit condition for applying to the summer fallow fields, in the end of July, or first of August. If the external parts get dry at any time during the process, it will be proper to water them thoroughly, and in many cases to turn over the heap completely. It may be added, that much benefit has been experienced from laying a thick coating of snow upon such heaps, as, by the gradual melting thereof, the whole moisture is absorbed, and a strong fermentation immediately follows.

Upon large farms, where the management of manure is sufficiently understood and practised, it is an important matter to have dunghills of all ages, and ready for use whenever the situation of a field calls for a restorative. No method of application to clay soils, however, is so beneficial as during the year of summer fallow, though in such situations, a greater stock of manure is often gathered than is required for the fields under this process.

As to the proper quantity of dung to be used, no greater quantity ought to be given at one time than is sufficient to fructify the ground; in other words, to render it capable of producing good crops, before the time arrives when a fresh dose can be administered.

The spreading of dung.

The increased attention now bestowed, in all the cultivated districts, to the spreading of dung, originated from the measure of limiting the quantity applied. When 40, 50, nay, even 60 double loads were applied to an acre, it was not very difficult to cover its surface, even with an imperfect separation, though it certainly was impracticable to bury the big lumps with a furrow of ordinary size; but when the quantity was brought down to 18 and 20 loads, and, more so, when 12 or 14 loads were thought sufficient, a different conduct became absolutely necessary. Another improvement also followed, viz. spreading dung when raw or green, that is, immediately after the carts; in which way, at least during summer, it will be separated at one half of the expense, and to much better purpose than when it is suffered to lay in the heap for a day or two. In short, it is a sure mark of a slovenly farmer, to see dung remain unspread in a field, unless it be in the winter months, when it may happen that hands cannot be got for carrying on such operations with the usual regularity. At that time the injury sustained by losing a few days is not great, though as a general rule it will be found that the expense is always smallest when the carts are regularly followed up.

Application of dung turnips.

When turnip husbandry forms the chief branch of fallow process, dung is naturally of a superior quality, and requires little artificial management for bringing it to a proper state of preparation. In the greatest part of Scotland, and even in England, where the drill and horse-hoeing system is practised, the common and undoubtedly the most approved way of applying dung to turnips, is by laying it in the intervals of the drills or small ridges, which are previously made up by a *bout*, or two furrows of the plough. These drills or ridges are formed at a distance of from 24 to 30 inches from the centre of each; and by driving the horses and cart along the middle one of the space intended to be manured, the dung is drawn out either by the carter, or by another man specially appointed for that purpose, in such proportions as the poverty of the soil, or the disposition of the occupier, may reckon necessary. If the breadth of three drills are only taken at a time, the dung stands a better chance of being regularly administered; for it often happens, that when a greater number are included in one space, the two outside drills receive a less quantity than the intervening ones. Those, therefore, who limit themselves to three drills, generally divide the spreaders; as it requires six hands, women or boys, to follow up what is usually called a head of carts, the number of carts to a head being regulated by the distance of the dung-hill, or the kind of road over which it is to be carried.

The quantity of dung usually given for turnips is from 12 to 15 double cart loads, of one and a half cubic yards each, to a Scots acre. In some cases only 10 loads are given; but the land ought to be in high condition where such a small quantity is bestowed. In fact, no soil can be made too rich for turnips or other green crops, peas excepted; but the object to be attended to in this, and every other case, is an allotment of the manure collected upon the premises, in such a way as that the greatest possible return over the whole farm, not from a particular field, may be gained by the occupier.

Application of dung to potatoes.

The culture is in several respects similar to that of turnips, but in others it differs materially. Potatoes are planted earlier in the season than turnips; the ground rarely receives so much work; the soils upon which they are cultivated are more variable; and the dung considered to be most suitable for promoting their growth, does not require such high preparation. Many farmers, notwithstanding these circumstances, follow out the same process as described under the head of turnips. After the ground receives three, or at most four ploughings, the drills are made up, dung deposited in the intervals, the seed planted above the dung, and the drills reversed; after which, say at the distance of 2 or 3 weeks, a slight harrowing is given. They avoid making up drills, but dung the ground in what may be called the broad-cast way; and, entering the plough, plant the seed in every third furrow, into which only the dung is raked; and so on till the whole is finished. Before the young plants appear, or even after they are above the surface, a complete harrowing is given, which is considered as equal to a hand-hoeing: and from the dung being completely covered, scarce any of it is dragged up, while the seed, being undermost, none of it is disturbed by the operation. Several farmers do not dung their potatoe fields; but reserving the manure till the is removed, find the remainder of the rotation greatly benefitted. Potatoes scourge severely, and, in general cases, require a larger quantity of dung than turnips; but as the extent of land under this culture is not great in common farming, few people grudge this extra quantity, because, except in a few favoured situations, a good crop cannot otherwise be reasonably expected.

To manure clayey soils.

Upon all soils incumbent on a wet or close bottom, whether characterized as clay, loam, or moor, it may be laid down as a primary principle, that dung cannot be so profitably applied, as while the ground is under the process of summer fallow.

When the ground is under the process of summer fallow, it is then the best and most appropriate time for applying manure to clay soils. When under this process, the soil comparatively speaking, is reduced into minute particles, which affords an opportunity of conveying the virtues of manure through the veins of all its parts. The soil, at that time, is also freed from its aboriginal inhabitants, quickens and other root-weeds, who claim a preferable right of support; hence the artificial plants, afterwards cultivated, possess, without a rival, such supplies as have been granted, without any deduction whatever. In short, without laying any stress upon elementary effects during the process, it does not admit of a doubt, that the same quantity of manure, bestowed upon the ground when summer fallowed, will produce a greater return to the occupier, than if it had been applied to any other stage of the rotation.

Dung should not be laid upon fallows before they are completely cleaned: though, no doubt, in wet summers, that operation is not easily accomplished. To make sure work, the fallows, if possible, should be early stirred, and no opportunity slipped of putting them forward with the utmost expedition; for it rarely happens, that much good can be done towards the destruction of root-weeds after the month of July. Before that time, a judicious farmer will have his fallow dressed up, and in a suitable state for receiving dung. It should be well harrowed, if the weather is favourable, previous to the dung being laid on; and if rolled, or made smooth, the spreaders will be enabled to perform their task with much more precision.

At the proper season, every other operation ought to be laid aside, so that dung may be expeditiously drove out. To do it in wet weather is attended with pernicious effects; the horses are oppressed, a longer time is required, the land is poached, and in some measure deprived of all benefit from the previous fallow. These circumstances will be reflected upon by the attentive farmer; they will stimulate him not to lose a moment when the weather is favourable, and prevent him from forcing on the work, when injury, rather than benefit, may be expected. After all, seasons are sometimes so perverse, as to render every rule nugatory. These must, however, be taken as they come; avoiding at such times to break the land down, acclivating the ridges sufficiently, and keeping the water-furrows completely clear.

Quantity of dung for fallows.

The quantity of dung usually applied to fallows in ordinary condition is from fourteen to twenty double loads per acre; though often good crops are reaped when twelve loads only had been given. Much, however, depends upon the condition of the land, upon the quality of the dung, and the way in which the carts are loaded. A decent load may contain one cubic yard and three-fourths, and weigh a ton, or thereabout. It also deserves notice, that less dung will serve some lands than others, especially if they have lately been ploughed from grass; but at all events, sixteen such loads as are mentioned, will answer for any sort of soil, unless it has been previously quite wrought out. Even if it were in this forlorn state, it is better management to dung upon the stubble of the first crop, than to give an overdose when under summer fallow.

Time of spreading the dung.

All dung laid upon summer fallow ought to be spread the moment it is pulled out of the cart. It can at no other time be done so well, or so cheap; though on many farms, small ones especially, where a full supply of hands are wanting, this beneficial practice is much neglected. Four spreaders, boys or girls, with an attentive oversman to follow up, and supply any omissions, are sufficient for one head of carts; the number included in a head being regulated by the distance of the field from the dunghill. Some farmers employ a person, on whom they can depend, to draw the dung from the cart, who has judgment to proportion it according to circumstances, and is responsible for any failure in the execution: but the carter is the person usually employed, though, unless a boy is given him to drive, a regular distribution can hardly be expected. To insure accuracy in laying down, fields are sometimes thrown into a dam-broad figure; and, a heap being drawn out into each square, you could have nearly ascertained the quantity required for the whole. The great object, after a regular and economical distribution, is to shake and part the whole completely; as, by minute attention to this circumstance, a much greater effect is necessarily produced.

Intermediate dunging.

After the fallows are dunged, the remainder in hand is reserved for what may be called the intermediate dunging, generally bestowed either upon clover stubbles, upon wheat stubbles previous to taking beans, or upon bean stubbles before the seed furrow is given for wheat. It is obvious, that the farmer must be regulated, in this intermediate dunging, by the weather at the time, though it rarely happens but that dung may be got out upon clover stubbles at one time of the winter or other. When applied to beans, a beneficial practice, the dung, as we said above, is by some people laid upon the wheat stubble, and ploughed down before winter; hence it is in full action in the spring, when the seed furrow is given. Others make up drills at seed time, depositing the dung in the intervals, as for turnips or potatoes; but it seldom occurs that weather can then be got, at least on real bean soils, for executing this management.

Many arable farms, under the strictest economy, are unable to furnish supplies for an intermediate dunging, at least to its full extent: but persons so circumstanced have it always in their power to overcome this defect, and preserve a regular rotation, by keeping certain fields longer in grass, which of course will yield weightier crops when broken up, and stand less in need of manure during the after rotation. As, for instance, in a rotation of six, and it is here that the greatest shortcoming is felt, grass seeds to a certain extent, say a half, may be thrown in with the crop of wheat taken after fallow, which is the second year of the rotation; this part may be pastured for three years, and broken up in the sixth for oats, which concludes the course. Again, in a rotation of eight, grass seeds, in like manner, may be sown with a part of the fallow wheat, which part can be pastured for three years, then broken up for oats, succeeded by beans and wheat. By such arrangements, made according to circumstances, it is an easy matter to preserve a regular rotation, and to proportion the corn crops, to the quantity of manure collected upon the premises.

To increase the quantity of dung by soiling.

The practice of soiling or feeding horses or cattle in the house or farm-yard, is eminently calculated to increase the quantity of manure upon every farm, and to improve its quality.

The soiling of horses, in the summer months, on green clover and rye-grass, is a practice which prevails in every corn district, where farm labour is regularly executed. The utility of the practice does not need the support of argument; for it is not only economical to the farmer, but saves much fatigue to the poor animal: besides, the quantity of dung thereby gathered is considerable.

Oxen and cows, of all sorts, might be supported and fed in like manner, during the whole of the grass season. It is well known that milch-cows have, in several instances, been so kept: but it has rarely happened, that other descriptions of cattle have been fed for the butcher according to this mode, though it is perfectly practicable.

The chief benefit of soiling may be considered as arising from the immense quantity of fine dung which would thus be accumulated, and which can be returned to the ground in the succeeding season, after being properly fermented and prepared. In all corn-farms, at least those of clayey soils, it is a work of great difficulty to rot the straw produced upon it; and much of it is misapplied, in consequence of such soils being naturally unfit for raising green winter-crops.

If a numerous stock of cattle were kept either in the house, or in separate divisions of the fold-yard, all the straw threshed in the summer months might be immediately converted into dung, the quality of which would be equal, if not superior to what is made from turnips consumed at the stake.

Dung is the mother of good crops; and it appears that no plan can be devised by which a large quantity can be so easily and cheaply gathered, or by which straw can be so effectually rotted and rendered beneficial to the occupier of a clay-land farm, as the soiling of grass in the summer season. In a word, the dung of animals fed upon green clover, may justly be reckoned the richest of all dung. It may, from the circumstances of the season, be rapidly prepared, and may be applied to the ground at a very early period, much earlier than any other sort of dung can be used with advantage.

To make composts.

The use of manure, in the shape of compost, or ingredients of various qualities, mixed together in certain proportions, has long been a favourite practice with many farmers: though it is only in particular situations that the practice can be extensively or profitably executed. The ingredients used in these composts are chiefly earth and lime: sometimes dung, where the earth is poor; but lime may be regarded as the main agent of the process, acting as a stimulus for bringing the powers of the heap into action. Lime, in this view, may be considered as a kind of yeast, operating upon a heap of earth as yeast does upon flour or meal. It is obvious, therefore, that unless a sufficient quantity is given, the heap may remain unfermented: in which case little benefit will be derived from it as a manure.

The best kind of earth for compost is that of the alluvial sort, which is always of a rich greasy substance, often mixed with marl, and in every respect calculated to enrich and invigorate barren soils, especially if they are of a light and open texture. Old yards, deep head-lands, and scourings of ditches, offer themselves as the basis of compost middens; but it is proper to summer fallow them before hand, so that they may be entirely free of weeds. When the lime is mixed with the soil of these middens, repeated turnings are necessary, that the whole may be suitably fermented; and some care is required to apply the fermented mass at a proper time to the field on which it was to be used.

The benefit of such a compost in nourishing soils is even greater than what is gained by dressing them with dung.

Lord Meadowbank's directions for making compost of peat moss.

Let the peat- moss, of which compost is to be formed, be thrown out of the pit for some weeks or months, in order to lose its redundant moisture. By this means, it is rendered the lighter to carry, and less compact and weighty, when made up with fresh dung for fermentation; and, accordingly, less dung is required for the purpose, than if the preparation is made with peat recently taken from the pit. The peat taken from near the surface, or at a considerable depth, answers equally well.

Take the peat moss to a dry spot convenient for constructing a dunghill to serve the field to be manured. Lay the cart-loads of it in two rows, and of the dung in a row betwixt them. The dung thus lies nearly on an area of the future compost dunghill, and the rows of peat should be near enough each other, that workmen, in making up the compost, may be able to throw them together by the spade. In making up, let the workmen begin at one end; and, at the extremity of the row of dung, (which should not extend quite so far at that end as the rows of peats on each side of it do,) let them lay a bottom of peat, six inches deep and fifteen feet wide, if the grounds admit of it; then throw forward, and lay on, about ten inches of peat above the bottom of peat; then add from the side rows about six inches of peat; then four or five of dung, and then six more of peat; then another thin layer of dung; and then cover it over with peat at the end where it was begun, at the two sides, and above. The compost should not be raised above four feet, or four feet and a half high; otherwise it is apt to press too heavily on the under parts and check the fermentation. When a beginning is thus made, the workmen will proceed working backwards, and adding to the columns of compost, as they are furnished with the three rows of materials directed to be laid down for them. They must take care not to tread on the compost, or render it too compact; and in proportion as the peat is wet, it should be made up in lumps, and not much broken.

In mild weather, seven cart-loads of common farm-dung, tolerably fresh made, is sufficient for twenty-one cart-loads of peat-moss; but in cold weather, a larger proportion of dung is desirable. To every twenty-eight carts of the compost, when made up, it is of use to throw on, above it, a cart-load of ashes, either made from coal, peat, or wood; half the quantity of slaked lime, the more finely powdered the better.

The compost, after it is made up, gets into a general heat, sooner or later, according to the weather, and the condition of the dung. In summer, in ten days or sooner; in winter, not perhaps for many weeks, if the cold is severe. In the former season, a stick should be kept in it in different parts, to pull out and feel now and then; for, if it approaches blood-heat, it should either be watered or turned over: and on such an occasion, advantage may be taken to mix with it a little fresh moss. The heat subsides after a time, and with great variety, according to the weather, the dung, and the perfection of the compost; which should then be allowed to be untouched, till within three weeks of using, when it should be turned over upside down, and outside in, and all lumps broken: then it comes into a second heat; but soon cools, and should be taken out for use. In this state, the whole, except bits of the old decayed wood, appears a black free mass, and spreads like garden mould. Use it weight for weight, as farm-yard dung; and it will be found, in a course of cropping, fully to stand the comparison.

Peat, nearly as dry as garden-mould in seed-time, may be mixed with the dung, so as to double the volume and more of it. Workmen must begin with using layers: but, when accustomed to the just proportions, if they are furnished with peat moderately dry, and dung not lost in litter, they throw it up together as a mixed mass, and make a less proportion of dung serve for the preparation.

The rich coarse earth, which is frequently found on the surface of peat, is too heavy to be admitted into this compost: but it makes an excellent top-dressing, if previously mixed and turned over with lime.

Dr. Rennie's method of converting moss into manure.

The importance of moss as a manure, is now generally admitted by all who have had an opportunity of making experiments on that subject. The Rev. Dr. Rennie, of Kilsyth, having proved the utility of filtration, has recommended in private letters, to water the collected heap of moss for about ten days, once each day, very copiously; and when that is done, to trim it up to a compact body, allow it to dry, and to receive a gentle degree of heat. The degree of heat necessary for accomplishing that end, is sufficient though not discoverable by the hand. If it only affects the thermometer a little, it is declared to be a manure. The Doctor also declares, that moss can be converted by filtrating steam through it; and more expeditiously still, by exposing it to a running stream of water. If the water penetrates the moss, it expels its poisonous qualities sooner and more effectually than any other mode ever devised. When it is sufficiently purified by any of these means, it must be laid up to dry, and is in a short time ready for applying to the land.

Use of lime as manure.

This mineral, after undergoing the process of calcination, has long been applied by British husbandmen as a stimulus to the soil, and, in consequence of such an application, luxuriant crops have been produced, even upon soils apparently of inferior quality, and which would have yielded crops of trifling value, had this auxiliary been withheld. In fact, the majority of soils cannot be cultivated with advantage till they are dressed with lime; and whether this beneficial effect shall be considered as an alterative, or as a stimulant, or as a manure, it will be found to be the basis of good husbandry, and of more use than all other manures put together. Wherever lime has been properly applied, it has constantly been found to prove as much superior to dung, as dung is to the rakings of roads, or the produce of peat mire.

In respect of operation, it is immaterial whether lime be used upon grass land or summer-fallow. Upon old grass land, it is perhaps best to plough first, and to summer-fallow in the second year, when lime can be applied. On new and clean grass land, it may be limed at the outset, that is, before the plough is admitted.

To lime moorish soils is a hazardous business, unless dung is likewise bestowed: but to repeat the application upon such soils, especially if they have been severely cropped, is almost a certain loss; a compost of lime and rich earth is, in such cases, the only substitute.

Strong loams and clays require a full dose to bring them into action: such soils being capable of absorbing a greater quantity of calcareous matter. Lighter soils, however, require less lime to stimulate them, and may be injured by administering a quantity that would prove moderately beneficial to those of a heavy nature.

Upon fresh land, or land in a proper state for a calcareous application, lime is much superior to dung. Its effects continue for a longer period; while the crops produced are of a superior kind, and less susceptible of injury from the excesses of drought and moisture. Finally, the ground, particularly what is of a strong nature, is much easier wrought; and, in many instances, the saving of labour would almost tempt a judicious farmer to lime his land, were no greater benefit derived from the application than the opportunity thereby gained of working it in a perfect manner.

It may be added, that though strong soils require to be animated with a strong dose of lime, those of a light texture will do well with little more than half the quantity requisite on the others, especially if they are fresh, or have not already received an application of calcareous matter.

Application of marl.

In many parts of this island, the value of land has been much augmented by the application of marl. Treating of this article in a practical way, it may be divided into shell marl and earth-marl. Shell marl is composed of animal shells dissolved; earth-marl is a fossil. The colour of the latter is various; its hardness being sometimes soft and ductile, like clay, sometimes hard and solid, like stone, and sometimes it is extended into thin beds, like slate. Shell-marl is easily distinguished by the shells, which always appear in it: but the similarity betwixt earth-marl, and many other fossil substances, renders it difficult to distinguish them.

Shell-marl is very different in its nature from clayey and stone marls, and from its effects upon the soil, is commonly classed among the animal manures: it does not dissolve with water as the other marls do. It sucks it up, and swells with it like a sponge. Dr. Home says, that it takes six times more of acids to saturate it, than any of the other marls which he had met with. But the greatest difference, betwixt the shell-marl and the other marls, consists in this, the shell-marl contains oils. It is uncertain if the other marls contain any oils; but this kind contains them in great plenty.

This marl, it would seem from the qualities which it possesses, promotes vegetation in all the different ways. It increases the food of plants; it communicates to the soil a power of attracting this food from the air; it enlarges the pasture of plants; and it prepares the vegetable food for entering their roots.

Shelly sand.

The shelly sand, often found deposited in beds in the crevices and level parts of the sea coasts, is another substance capable of being employed, both as a manure and stimulant, not only on account of its containing calcareous matter in greater or less proportions, but also from the mixture of animal and vegetable substances that are found in it. The portion of calcareous matter contained in these substances, must vary according to circumstances; but, when the quantity is any way large, and in a reduced or atenuated state, the quality is so much the more valuable. On that account, the quantity which ought to be applied to the soil, must be regulated entirely by the extent of calcareous matter, supposed, or found, upon trial, to be contained in the article.

Clayey and stone marls.

The clayey and stone marls are distiuguished by their colours; viz. white, black, blue, and red. The white, being of a soft crumbly nature, is considered to be the best for pasture land; and the blue, which is more compact and firm, for corn land. In the districts where marl is much used, these distinctions of management are attended to, though either of the kinds may be employed with advantage, if the following rules are adhered to.

If the marl is of the blue kind, or of any kind that is compact or firm, lay it upon the land early in the season, so as the weather may mellow it down before the last plough: and, if on pasture land, let it also be early laid on, and spread very thin, breaking any lumps afterwards which are not completely separated by the first spreading. If marl is of the white, or any of the loose or crumbling sorts, it need not be laid on so early; because these varieties break and dissolve almost as soon as exposed to the weather.

Alga marina, or sea-weed.

Sea-weed, a plant that grows upon rocks within the sea, is driven ashore after storms, and is found to be an excellent article for manuring light and dry soils, though of little advantage to those of a clayey description. This article may be applied on the proper soil with advantage to any crop, and its effects are immediate, though rarely of long continuance. As the coast side lands of the island are, in every case, of superior fertility to those that are inland, we may attribute this superior fertility to the great quantity of manure found upon their shores after every storm or high tide, whereby the resources of the ocean are in a manner brought forward for the enrichment of the lands locally situated for participating in such benefits. The utmost attention has long been paid to the gathering and laying on of this valuable manure: and, from the extensive line of British shores, both of the main sea and of the numerous estuaries which indent, and as it were divide the main land, an immense quantity of sea-weed must annually be collected from them.

Application of sea-weed.

Sea-weed is applied at all seasons to the surface, and sometimes, though not so profitably, it is mixed with untrodden dung, that the process of putrefaction may be hastened. Generally speaking, it is at once applied to the soil, which saves labour, and prevents that degree of waste, which otherwise would necessarily happen. Sea-weed is, in one respect, preferable to the richest dung; because it does not produce such a quantity of weeds. The salts contained in sea-weed, and applied with it, is the real cause of the after-cleanliness. This may be inferred from the general state of coast-side lands, where sea-weed is used. These lands are almost constantly kept in tillage, and yet are cleaner and freer from weeds than those in the inland situations, where corn crops are not so often taken.

When a coast-side farm contains mixed soils, the best management is exercised, by applying sea-weed to dry, and dung to clay-land. In this way, the full advantage of manure may be obtained, and a farm so circumstanced is of infinitely greater value, with respect to manuring aud labouring, than one which contains no such variety.

Burning the surface.

The practice of burning the surface, and applying the ashes as manure to the soil that remains, has been long prevalent in Britain; and is considered as the most advantageous way of bringing in and improving all soils, where the surface carried a coarse sward, and was composed of peat-earth, or other inactive substances. The burning of this surface has been viewed as the best way of bringing such soils into action; the ashes, furnished by the burning, serving as a stimulant to raise up their dormant powers, thereby rendering them fertile and productive in a superior degree than could otherwise be accomplished.

Mr. Curwen's method of burning surface soil and clay.

Mounds of seven yards in length, three and a half in breadth, are kindled with 72 Winchester bushels of lime.—First, a layer of dry sods or parings, on which a quantity of lime is spread, mixing sods with it, then a covering of eight inches of sods, on which the other half of the lime is spread, and covered a foot thick; the height of the mound being about a yard.

In 24 hours it will take fire. The lime should be immediately from the kiln. It is better to suffer it to ignite itself, than to effect it by the operation of water. When the fire is fairly kindled, fresh sods must be applied. I should recommend obtaining a sufficient body of ashes before any clay was put on the mounds. The fire naturally rises to the top. It takes less time, and does more work to draw down the ashes from the top, and not to suffer it to rise above six feet. The former practice of burning in kilns was more expensive; did much less work; and, in many instances, calcined the ashes.

I think it may fairly be supposed that the lime adds full its worth to the quality of the ashes. Where limestone can be had, I should advise the burning a small quantity in the mounds, which would be a great improvement to the ashes, and, at the same time, help to keep the fire in.

The general adopting of the system of surface and soil clay-burning, is likely to be the most important discovery for the interests of agriculture, that has occurred since the introduction of the turnip into Norfolk, by Lord Townshend.

To burn moss with the ashes.

The following directions for burning moss along with the ashes are of considerable importance: Begin the fire with dry faggots, furze, or straw, then put on dried moss finely minced and well beaten with a clapper; and when that is nearly burnt down, put on moss less dry, but well minced and clapped, making holes with a prong to carry on the fire, and so adding more moss, till a hill of ashes, something of the size of a waggon load, is accumulated, which, when cold, carry to the bins, or store heaps, before the ashes get wet.

Mr. Roscoe's method of improving moss land.

The best method of improving moss land, is by the application of a calcareous substance in a sufficient quantity to convert the moss into a soil, and by the occasional use of animal or other extraneous manures, such as the course of cultivation, and the nature of the crops may be found to require.

After setting fire to the heap and herbage on the moss, and ploughing it down as far as practicable, Mr. Roscoe ploughs a thin sod or furrow, with a very sharp horse-plough, which he burns in small heaps and dissipates; considering it of little use but to destroy the tough woods of the ediophorus, nardus stricta, and other plants, whose matted roots are almost imperishable. The moss being thus brought to a tolerable dry and level substance, then plough it in a regular furrow six inches deep: and as soon as possible after it is turned up, set upon it the necessary quantity of marl, not less than two hundred cubic yards to the acre. As the marl begins to crumble and fall with the sun or frost, it is spread over the land with considerable exactness; after which, put in a crop as early as possible, sometimes by the plough, and at others with the horse-scuffle, or scarifier, according to the nature of the crop; a quantity of manure, setting on about 20 tons to the acre. Moss land, thus treated, may not only be advantageously cropped the first year with green crops, as potatoes, turnips, &c. but with any kind of grain.

Peat and peat-ashes used as manure.

In the county of Bedford, peat-ashes are sold as manure, and are used as a top dressing for clovers, and sometimes for barley, at the rate of from 40 to 60 Winchester bushels per acre. They are usually spread during the month of March, on clover ; and on the surface of the barley-lands after the seed is sown. Peat-ashes are also admirably useful as manure for turnips, and are easily drilled with or over the reed, by means of a drill-box, connected with a loaded cart.

After the quantity required has been cast, a portion sufficient to kindle a large heap, (suppose two cart-loads,) is dried as much as if intended for winter's use. A conical pile is then built and fired; and as soon as the flame or smoke makes its appearance at any of the crevices, it is kept back by fresh peat, just sufficiently dry to be free from water: and thus the pile is continually increased, until it has burnt thirty or forty loads, or as much more as may be required. The slower the process the better ; but, in case of too languid a consumption, the heap should be stirred by a stick, whenever the danger of extinction seems probable.

In case of rain, the workman should be prepared with some coarse thick turf, with which to cover the surface of the cone.

Coal ashes used as manure.

Coal ashes may likewise be made a most useful article of manure, by mixing with every cart-load of them one bushel of lime in its hottest state, covering it up in the middle of the heap for about 12 hours, till the lime be entirely slaked, and incorporating them well together; and, by turning the whole over two or three times, the cinders, or half-burnt parts of the coal, will be reduced to as fine a powder as the lime itself. The coal-ashes should, however, be carefully kept dry: this mixture will be found one of the best improvers of moorish and benty land.

Method of burning lime without kilns.

The practice of lime-burners in Wales has formerly been to burn lime in broad shallow kilns, but lately they have begun to manufacture that article without any kiln at all.

They place the lime stone in large bodies, which are called coaks, the stones not being broken small, as in the ordinary method, and calcine these heaps in the way used for preparing charcoal. To prevent the flame from bursting out at the top and sides of these heaps, turfs and earth are placed against them, and the aperture partially closed; and the heat is regulated and transfused through the whole mass, that, notwithstanding the increased size of the stones, the whole becomes thoroughly calcined. As a proof of the superior advantage that lime burnt in these clamps or coaks has over lime burnt in the old method, where farmers have an option of taking either lime at the same price, a preference is invariably given to that burned in heaps. This practice has long prevailed in Yorkshire and Shropshire, and is also familiar in Scotland.

Mr. Craig's improved method of burning clay.

Make an oblong enclosure, of the dimensions of a small house—say 15 feet by 10—of green turf-seeds, raised to the height of 3 1-2 or 4 feet. In the inside of this enclosure air-pipes are drawn diagonally, which communicate with holes left at each corner of the exterior wall. These pipes are formed of sods put on edge, and the space between so wide only as another sod can easily cover. In each of the four spaces left between the air pipes and the outer-wall, a fire is kindled with wood and dry turf, and then the whole of the inside of the enclosure or kiln filled with dry turf, which is very soon on fire ; and, on the top of that, when well kindled, is thrown on the clay, in small quantities at a time, and repeated as often as necessary, which must be regulated by the intensity of the burning. The air-pipes are of use only at first, because if the fire burns with tolerable keenness, the sods forming the pipes will soon be reduced to ashes. The pipe on the weather side of the kiln only is left open, the mouths of the other three being stopped up, and not opened except the wind should veer about. As the inside of the enclosure or kiln begins to be filled up with clay, the outer wall must be raised in height, at least 15 inches higher than the top of the clay, for the purpose of keeping the wind from acting on the fire. When the fire burns through the outer wall, which it often does, and particularly when the top is over loaded with clay, the breach must be stopped up immediately, which can only be effectually done by building another sod wall from the foundation opposite to it, and the sods that formed that part of the first wall are soon reduced to ashes. The wall can be raised as high as may be convenient to throw on the clay, and the kiln may be increased to any size by forming a new wall when the previous one is burnt through.

The principal art in burning consists in having the outer wall made quite close and impervious to the external air, and taking care to have the top always lightly, but completely covered with clay; because if the external air should come in contact with the fire, either on the top of the kiln, or by means of its bursting through the sides, the fire will be very soon extinguished. In short, the kilns require to be well attended, nearly as closely as charcoal pits. Clay is much easier burnt than either moss or loam;—it does not undergo any alteration in its shape, and on that account allows the fire and smoke to get up easily between the lumps;—whereas moss and loam, by crumbling down, are very apt to smother the fire, unless carefully attended to. No rule can be laid down for regulating the size of the lumps of clay thrown on the kiln, as that must depend on the state of the fire. After a kiln is fairly set going, no coal or wood, or any sort of combustible, is necessary, the wet clay burning of itself, and it can only be extinguished by intention, or the carelessness of the operator, the vicissitudes of the weather having hardly any effect on the fires, if properly attended to. When the kiln is burning with great keenness, a stranger to the operation may be apt to think that the fire is extinguished: If, therefore, any person, either through impatience, or too great curiosity, should insist on looking into the interior of the kiln, he will certainly retard and may possibly extinguish the fire;—the chief secret consisting, as before-mentioned, in keeping out the external air.

The above method of burning clay may be considered as an essential service rendered to agriculture; as it shews farmers how to convert, at a moderate expense, the most worthless barren subsoil into excellent manure.

To decompose green vegetables for manure.

The following process for the decomposition of green vegetables, for manure, has been practised with great success in the counties of Norfolk and Suffolk:—

Place a layer of vegetable matter a foot thick, then a thin layer of lime, alternately; in a few hours the decomposition will begin, and unless prevented by sods, or a forkful of vegetables, will break out into a blaze; this must be guarded against; in 24 hours the process will be completed. Weeds of every description will answer for vegetables; two pounds' worth of lime will produce manure for four acres. Use the vegetables as soon after cutting as possible, and the lime fresh from the kiln, as distance will allow.

Bone manure.

At Hull there is a mill constructed for the purpose of bruising (not pounding) bones; and the dust riddled therefrom is reckoned a still stronger manure. The same person selects the best bones, which are sawn into pieces, for button-moulds and knife-handles: and the saw-dust from this operation is particularly useful in gardens and hot beds. It suits every vegetable, hot-house, or green-house plant.

Bone manure is most used in the west of Yorkshire, Holderness, and Lincolnshire, and is best adapted for cold and light sandy land. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes, as common manure of any sort, 30 bushels per acre is thought quite enough. It is applied at the same periods as other manure, and has been found in this way to remain 7 years in the ground. The rough part of this manure, after being 5 years in the ground, has been gathered off one field and thrown upon another of a different soil, and has proved, even then, good manure.

The bones which are best filled with oil and marrow are certainly the best manure; and the parts generally used for buttons and knife-hafts are the thigh and shank bones. The powdered bones are dearer, and generally used for hot-beds in gardens, being too expensive for the field, and not so durable as bruised bones, yet, for a short time, more productive.

A dry, light, or gentle soil, is best adapted for the use of bone-manure; as it is supposed that, in land which retains wet, the nutritive part of the bone washes to the surface of it and does not incorporate sufficiently with the soil.

Bruised bones are better when mixed with ashes, or any other manure, as the juice of the bones is then more equally spread over the field. Bone manure ought to be ploughed into the land in tillage. On the grass the powder should be sown in the hand.

This manure is used on land before described, to the extent of several thousand acres in the higher part of Nottinghamshire, the Wolds (or high light land) in Lincolnshire, and the East and West Riding of Yorkshire.

Moss used as manure.

Moss-earth will, without any preparation whatever, operate as a manure to any other soil. The extreme cohesiveness of clay is often a bar to its improvement: pure sand is unproductive from a contrary cause. If these are mixed with each other, or if moss-earth is mixed with either, they will be cured of these defects. The tenacious clay will be rendered more open; the moisture will more easily percolate; a greater scope will be given to the roots of plants; they will not be so retentive of moisture in wet weather, nor so adhesive when dry.

A mixture of moss among sand will deepen the soil, render it more retentive of moisture, and prevent the crop from being so readily injured by the drought.

But it is much better to bring the moss into a course of putridity by some fermenting admixture before it is applied to any soil. If no such mixture can be procured, let the moss-earth be thrown up in heaps, first exposed to the frost, and then to the other changes of weather for a year or two; and if it is turned, some sand or clay mixed with it, and the whole exposed for two seasons to the weather, it will form a tolerable manure.

If moss-earth is minutely mixed with newly slaked lime, in a powdery state, and laid up for a few months, and once or twice turned over, well broken, and a small quantity of new lime thrown in when turned over, the antiseptic qualities of the moss, in the course of a year after being so mixed, will be overcome, and the moss brought into a state of rapid decomposition, and thereby formed into as good manure as so much straw, or other vegetables, that had been taken from the arable lands.

To prepare it with lime.

Dig up the moss, and throw it into heaps after harvest, or early in winter, so that the frost may operate, and in part reduce its texture, before the drought forms it into peat. When dug up, and exposed to summer drought, before the frost has loosened its adhesion, it becomes a real peat, and will not be again so easily broken down by the weather.

After being exposed to the weather for a whole winter, the moss-earth may be removed in the spring to the field to which it is intended to be applied, and when it is between wet and dry, thrown up, and mixed with about a fifth or sixth part of its weight of hot newly-slaked lime, in a powdery state. The moss should be as much broken as possible, and minutely mixed with lime.

Various substances used as manure.

J. B. Bailey, Esq. lately presented to the Agricultural Society of Manchester, the following enumeration of substances which may be applied usefully as manures, instead of stable dung, viz. mud, sweepings of the streets, and coal-ashes; night soil; bones; refuse matters, as sweepings and rubbish of houses, &c. sea-weed, sea-shells, and sea-gravel, river-weeds, sweepings of roads, and spent tanners' bark to mix with lime. Peat or moss, decayed vegetables, putrid water, the ashes of weeds, &c. the refuse of bleacher's ashes, soap suds, or ley, peat ashes, water in floating, refuse salt.

Plaister of Paris used as manure.

Plaister of Paris is used as a manure in Pennsylvania. The best kind is imported from hills in the vicinity of Paris: it is brought down the Seine, and exported from Havre de Grace. The lumps composed of flat shining specula are preferred to those which are formed of round particles like sand: the simple method of finding out the quality is to pulverize some, and put it dry into an iron pot over the fire, when that which is good will soon boil, and great quantities of the fixed air escape by ebullition. It is pulverized by first putting it in a stamping-mill. The finer its pulverization the better, as it will thereby be more generally diffused.

It is best to sow it on a wet day. The most approved quantity for grass is six bushels per acre. No art is required in sowing it more than making the distribution as equal as possible on the sward of grass. It operates altogether as a top manure, and therefore should not be put on in the spring until the principal frosts are over and vegetation hath begun. The general time for sowing in America, is in April, May, June, July, August, and even as late as September. Its effects will generally appear in ten or fifteen days; after which the growth of the grass will be so great as to produce a large burden at the end of six weeks after sowing.

It must be sown on dry land, not subject to be overflown. It has been sown on sand, loam, and clay, and it is difficult to say on which it has best answered, although the effect is sooner visible on sand. It has been used as a manure in this state for twelve years; for, like other manure its continuance very much depends on the nature of the soil on which it is placed.

Mode of applying blubber as a manure.

This is a very rich ingredient, as well for arable as pasture land, when mixed at the rate of one ton of blubber to 20 loads of mould, and 1 chaldron of lime, per acre. It must be turned over and pulverized; and when it has lain in this state three or four months, it will become fit for use, and may be put upon the land in such quantities as the quality of the land to be manured requires. It is a very strong manure, and very excellent.

Application of manures to land.

Early in autumn, after the hay crop is removed, is the most convenient and least objectionable period for the purpose. The common practice is to apply manures, during the frost, in the winter. But the elastic fluids being the greatest supports of vegetation, manures should be applied under circumstances that favour their generation. These will occur in spring, after the grass has, in some degree, covered the ground, the dung being then shaded from the sun. After a frost much of the virtues of the dung will be washed away by the thaw, and its soluble parts be destroyed: and in a frosty state, the ground is incapable of absorbing liquids.

Management of arable land.

Alternate husbandry or the system of having leguminous and culmiferous crops to follow each other, with some modifications, is practicable on every soil. According to its rules, the land would rarely get into a foul and exhausted state; at least, if foul and exhausted under alternate husbandry, matters would be much worse were any other system followed. The rotation may be long or short, as is consistent with the richness of the soil, on which it is executed, and other local circumstances. The crops cultivated may be any of the varieties which compose any of the two tribes according to the nature of soil and climate of the district where the rotation is exercised; and where circumstances render ploughing not so advantageous as pasturing, the land may remain in grass, till these circumstances are obviated; care being always taken, when it is broken up, to follow alternate husbandry during the time it is under tillage.

In this way we think it perfectly practicable to follow the alternate system in every situation; nor do we consider the land being in grass for two, three, or four years, as a departure from that system, if called for by a scarcity of manure, poverty of soil, want of markets for corn, or other accidental circumstances. The basis of evey rotation we hold to be either a bare summer fallow, or a fallow on which drilled turnips are cultivated, and its conclusion to be with the crop taken in the year preceding a return of fallow or drilled turnips, when, of course, a new rotation commences.

First rotation of crops.

According to this rotation, wheat and drilled beans are the crops to be cultivated, though clover and rye-grass may be taken for one year, in place of beans, should such a variety be viewed as more eligible. The rotation begins with summer fallow, because it is only on strong deep lands that it can be profitably practised; and it may go on for any length of time, or so long as the land can be kept clean, though it ought to stop the moment that the land gets into a contrary condition. A considerable quantity of manure is required to go on successfully; dung should be given to each bean crop; and if this crop is drilled, and attentively horse-hoed, the rotation may turn out to be one of the most profitable that can be exercised.

Second rotation.

Upon loams and clays, where it may not be advisable to carry the first rotation into execution, a different one can be practised; according to which labour will be more divided, and the usual grains more generally cultivated; as, for instance:—

1. Fallow, with dung. 2. Wheat. 3. Beans, drilled and horse-hoed. 4. Barley. 5. Clover and rye-grass. 6. Oats, or Wheat. 7. Beans, drilled and horse-hoed. 8. Wheat.

This rotation is excellently calculated to insure an abundant return through the whole of it, provided dung is administered upon the clover stubble. Without this supply, the rotation would be crippled, and inferior crops of course produced in the concluding years.

Third rotation.

This rotation is calculated for clays and loams of an inferior description to those already treated of.

1. Fallow with dung. 2. Wheat. 3. Clover and Rye-grass. 4. Oats. 5. Beans, drilled and horse-hoed. 6. Wheat.

According to this rotation, the rules of good husbandry are strenuously practised, while the sequence is obviously calculated to keep the land in good order, and in such a condition as to insure crops of the greatest value. If manure is bestowed, either upon the clover stubble, or before the beans are sown, the rotation is one of the best that can be devised for the soils mentioned.

Fourth rotation.

On thin clays, gentle husbandry is indispensably necessary, otherwise the soil may be exhausted, and the produce unequal to the expense of cultivation. Soils of this description will not improve much while under grass; but unless an additional stock of manure can be procured, there is a necessity of refreshing them in that way, even though the produce should, in the meantime, be comparatively of small value. The following rotation is an excellent one.

1. Fallow, with dung. 2. Wheat. 3. Grass, pastured, but not too early eaten. 4. Grass. 5. Grass. 6. Oats.

This rotation may be shortened or lengthened, according to circumstances, but should never extend further in point of ploughing, than when dung can be given to the fallow break. This is the key-stone of the whole; and if it is neglected, the rotation is rendered useless.

Fifth rotation.

Peat-earth soils are not friendly to wheat unless aided by a quantity of calcareous matter. Taking them in a general point of view, it is not advisable to cultivate wheat; but a crop of oats may almost be depended upon, provided the previous management has been judiciously executed. If the sub-soil of peat-earth lands be retentive of moisture, the process ought to commence with a bare summer fallow; but if such are incumbent on free and open bottoms, a crop of turnips may be substituted for fallow, according to which method, the surface will get a body which naturally it did not possess. Grass, on such soils, must always occupy a great space of every rotation, because physical circumstances render regular cropping utterly impracticable.

1. Fallow, or Turnips, with dung. 2. Oats, of an early variety. 3. Clover, and a considerable quantity of perennial Rye-grass. 4. Pasture for several years, till circumstances permit the land to be broken up, when oats are to be repeated.

Sixth rotation.

Light soils are easily managed, though to procure a full return of the profit which they are capable of yielding, requires generally as much attention as is necessary in the management of those of stronger description. Upon light soils, a bare summer fallow is seldom called for, as cleanliness may be preserved by growing turnips, and other leguminous articles. Grass also is of eminent advantage upon such soils, often yielding a greater profit than what is afforded by culmiferous crops.

1. Turnips. 2. Spring Wheat, or Barley. 3. Clover and Rye-grass. 4. Oats, or Wheat.

This rotation would be greatly improved, were it extended to eight years, whilst the ground by such an extension, would be kept fresh, and constantly in good condition. As for instance, were seeds for pasture sown in the second year, the ground kept three years under grass, then broke up for oats in the sixth year, drilled with beans and peas in the seventh, and sown with wheat in the eighth, the rotation would be complete; because it included every branch of husbandry, and admitted a variety in management generally agreeable to the soil, and always favourable to the interest of cultivators. The rotation may also consist of six crops, were the land kept only one year in grass, though few situations admit of so much cropping, unless additional manure is within reach.

Seventh rotation.

Sandy soils, when properly manured are well adapted to turnips, though it rarely happens that wheat can be cultivated on them with advantage, unless they are dressed with alluvial compost, marl, clay, or some such substances as will give a body or strength to them which they do not naturally possess. Barley, oats, and rye, the latter especially, are, however, sure crops on sands; and, in favourable seasons, will return greater profit than can be obtained from wheat.

1. Turnips, consumed on the ground. 2. Barley. 3. Grass. 4. Rye or Oats.

By keeping the land three years in grass, the rotation would be extended to six years, a measure highly advisable.

From what has been stated, every person capable of judging will at once perceive the facility of arranging husbandry upon correct principles, and of cropping the ground in such a way as to make it produce abundant returns to the occupier, whilst at the same time it is preserved in good condition, and never impoverished or exhausted. All these things are perfectly practicable under the alternate system, though it is doubtful whether they can be gained under any other.

It may be added, that winter sown crops, or crops sown on the winter furrow, are most eligible on all clayey soils.

Ploughing, with a view to clean soils of the description under consideration, has little effect unless given in the summer months. This renders summer fallow indispensably necessary; and, without this radical process, none of the heavy and wet soils can be suitably managed, or preserved in a good condition.

To adopt a judicious rotation of chopping for every soil, requires a degree of judgment in the farmer, which can only be gathered from observation and experience. The old rotations were calculated to wear out the soil, and to render it unproductive; but the modern rotations, such as those which we have described, are founded on principles which insure a full return from the soil, without lessening its value, or impoverishing its condition. Much depends, however, upon the manner in which the different processes are executed; for the best arranged rotation may be of no avail, if the processes belonging to it are imperfectly and unreasonably executed.

To cultivate wheat.

On soils really calculated for wheat, though in different degrees, summer-fallow is the first and leading step to gain a good crop or crops of that grain. The first furrow should be given before winter, or as early as the other operations of the farm will admit; and every attention should be used to go as deep as possible; for it rarely happens that any of the succeeding furrows exceed the first one in that respect. The number of after-ploughings must be regulated by the condition of the ground and the state of the weather; but in general, it may be observed, that ploughing in length and across, alternately, is the way by which the ground will be most completely cut, and the intention of fallowing accomplished.

Varieties of seed.

Wheat may be classed under two principal divisions, though each of these admits of several subdivisions. The first composed of all the varieties of red wheat. The second division comprehends the whole varieties of white wheat, which again may be arranged under two distinct heads, namely, thick chaffed and thin chaffed.

The thick chaffed varieties were formerly in greatest repute, generally yielding the whitest and finest flour, and in dry seasons, not inferior in produce to the other; but since 1799, when the disease called mildew, to which they are constitutionally predisposed, raged so extensively, they have gradually been going out of fashion.

The thin chaffed wheats are a hardy class, and seldom mildewed, unless the weather be particularly inimical during the stages of blossoming, filling, and ripening, though some of them are rather better qualified to resist that destructive disorder than others. In 1799, few thin chaffed wheats were seriously injured; and instances were not wanting to to show, that an acre of them, with respect to value, exceeded an acre of thick chaffed wheat, quantity and quality considered, not less than 50*l.* per cent. Since that time, therefore, their culture has rapidly increased; and to this circumstance may, in a great measure, be attributed the high character which thin chaffed wheats now bear.

Method of sowing.

Sowing in the broad-cast way may be said to be the mode universally practised. Upon well prepared lands, if the seed be distributed equally, it can scarcely be sown too thin; perhaps two bushels per acre are sufficient; for the heaviest crops at autumn are rarely those which show the most vigorous appearance through the winter months. Bean stubbles require more seed than summer fallows, because the roughness of the surface prevents such an equal distribution; and clover leas ought to be still thicker sown than bean stubbles. Thin sowing in spring ought not to be practised, otherwise the crop will be late, and imperfectly ripened. No more harrowing should be given to fields that have been fallowed, than what is necessary to cover the seed, and level the surface sufficiently. Ground which is to lie in a broken down state through the winter, suffers severely when an excessive harrowing is given, especially if it is incumbent on a close bottom; though, as to the quantity necessary, none can give an opinion, except those who are personally present.

To sow grain by ribbing.

The ribbing of grain crops was introduced into Northumberland, in the year 1810. The process is as follows: Suppose the land in fallow, or turnips eat off, let it be gathered into ridges of twelve feet each; then harrow it well, particularly the furrows of the ridges; after which take a narrow-bottomed swing plough, five inches and a half broad at the heel, with a narrow-winged sock, drawn by one horse; begin in the furrow, as if you intended to gather two ridges together, which will make a rib exactly in the middle of the furrow; then turn back up the same furrow you came down, keeping close to the rib made; pursue the same mode on the other side, and take a little of the soil, which is thrown over by the mould-board from the back of each rib, and so on till you come near the furrow, when you must pursue the same mode as at first. In water furrowing you will then have a rib on each side of the furrow, distance between the rib, ten or twelve inches. The seed to be sown by the hand; and, from the narrowness or sharpness of the top of the ridges, the grain will fall regularly down; then put on a light harrow to cover the seed. In wet soils the ridges ought to be twice gathered, as ribbling reduces them.

It will answer all kinds of crops, but not all soils. Strong clayey soils cannot be pulverized sufficiently for that purpose; nor can it be effected in clover-lea, unless it be twice ploughed, and well harrowed. Ribbing is here esteemed preferable to drilling, as you have the same opportunity of keeping the land clean, and the grain does not fall so close together, as by drilling.

The farmer may hand or horse-hoe his crops, and also hoe in his clover-seed : which is considered very advantageous. It is more productive of grain, especially when it is apt to lodge ; and, in all cases, as much straw ; and ribbing is often the means of preventing the corn lodging.

In a wet season, ribbing is more favourable to harvesting : because the space between the ribs admits the air freely, and the corn dries much sooner. The reapers, also, when accustomed to it, cut more, and take it up cleaner.

Improved method of drilling wheat.

The drill contains three coulters, placed in a triangular form, and worked by brushes, with cast-iron nuts, sufficient for one horse to draw, and one man to attend to. It will drill three acres per day of wheat, barley, or oats, at five inches asunder ; and five acres per day of beans, peas, &c. at 12 inches asunder. The general practice is to drill crossways, and to set the rows five or six inches, and never exceeding seven inches apart, it being found that, if the distance is greater, they are too long filling up in the spring; that they afford a greater breadth for the growth of weeds; are more expensive to hoe, and more liable to be laid in the summer. In drilling wheat, never harrow after the drill, if it can be avoided ; the drill generally leaving the corn sufficiently covered ; and by this plan, the vegetation is quickened, and the ridges of soils, between each row, preserve the plants in winter, and render the operation of harrowing in the spring much more efficacious. The spring harrowing is performed the contrary way to that of the drilling, as the harrow working upon the ridges does not pull up the plants, and leaves the ground mouldy for the hoe. This point should be particularly attended to. The harrowing after the drill, evidently leaves the ground in a better state to the eye; but the advantage in the produce of the crop are decidedly in favour of the plan of leaving the land in the rough state already described ; as the operation of the winter upon the clods causes them to pulverize, and furnishes an abundant nutrition to the plants in the spring ; and followed by the hoe, about the time the head or ear is forming, it makes the growth of the plant more vigorous, and greatly improves the size of the head or ear. The drilling for wheat should generally commence about the latter end of September ; at which time the farmer may drill about two bushels per acre. As the season advances, keep increasing the quantity to three bushels per acre, being guided by the quality of the soil and other circumstances. A great loss has frequently arisen, through drilling too small a quantity of seed, as there can be none spared in that case for the rooks and grubs ; and a thick well planted crop will always yield more abundantly than a thin-stooling crop, and ripen sooner.

The drill system would have been in more general practice, if its friends had also recommended the use of a larger quantity of seed to the acre, and the rows to be planted nearer together. It is impossible to obtain so great a produce per acre by the broad-cast system, as by the drill system at the same expense, be the land ever so free from weeds. Fifty bushels per acre may be raised by the drill, but never more than 40 bushels by sowing broad-cast. The wheat crops should generally be top-dressed in winter with manure compost, or some other dressing in frost, or when you can cart upon the land ; but if that operation is rendered impracticable, sooting in March, or any other dressing of that description, hoed in at the spring, is preferable to a dressing laid on in the autumn, and ploughed in.

The advantages of the drill over the broadcast system are numerous and decisive ; as it enables the farmer to grow corn without weeds; is sooner ready for stacking after the scythe or sickles; produces a cleaner and more regular-sample for the market; and of consequence obtains a better price for a succeeding crop, and materially increases the quantity of food for human consumption.—*Farmer's Mag.* 1814.

To pickle the seed.

This process is indispensably necessary on every soil; otherwise smut, to a greater or less extent, will in nine cases out of ten assuredly follow. Stale urine may be considered as the safest and surest pickle ; and where it can be obtained in a sufficient quantity, is commonly resorted to. The mode of using it does not however, seem to be agreed upon; for while one party contends that the grain ought to be steeped in the urine, another party considers it sufficient to sprinkle the urine upon it. But whatever difference of opinion there may be as to the kind of pickle that ought to be used, and the mode of using it, all admit the utility of mixing the wetted seed with hot lime fresh slaked ; and this, in one point of view, is absolutely necessary, so that the seed may be equally distributed. It may be remarked, that experience justifies the utility of all these modes, provided they are attentively carried into execution. There is some danger from the first ; for, if the seed steeped in urine is not immediately sown, it will infalliby lose its vegetative power. The second, viz. sprinkling the urine on the seed, seems to be the safest, if performed by an attentive hand; whilst the last may do equally well, if such a quantity of salt be incorporated with the water, as to render it of sufficient strength. It may also be remarked, that this last mode is often accompanied with smut, owing no doubt to a deficiency of strength in the pickle; whereas a single head with smut is rarely discovered when urine has been used.

To cultivate Indian corn.

The land should be a loamy sand, very rich. In the beginning of April, the grains should be set like hops, at two feet distance, six or eight grains in a hill, each grain about an inch deep in the ground. The seed from New England is the best. In the beginning of May, the alleys should be hoed, and the hills weeded and earthed up higher. At the latter end of that month all the superfluous stalks should be taken away, and only three stems of corn left in each hill. By the middle of June it will cover the alley. It grows much like bulrushes, the lower leaves being like broad flags, three or four inches wide, and as many feet in length; the stems shooting upwards, from seven to ten feet in height, with many joints casting off flag-leaves at every joint. Under these leaves, and close to the stem, grows the corn, covered over by many coats of sedgy leaves, and so closed in by them to the stem, that it does not show itself easily, till there bursts out at the end of the ear a number of strings that look like tufts of horse-hair, at first of a beautiful green, and afterwards red or yellow, the stem ending in a flower. The corn will ripen in September; but the sun at that season not having strength enough to dry it, it must be laid upon racks, or thin open floors, in dry rooms, and frequently turned, to avoid moulding; the grains are about as big as peas, and adhere in regular rows round a white pithy substance, which forms the ear. An ear contains from two to four hundred grains, and is from six to ten inches in length. They are of various colours, blue, red, white, and yellow. The manner of gathering them is by cutting down the stems and breaking off the ears. The stems are as big as a man's wrist, and look like bamboo cane: the pith is full of a juice that tastes as sweet as sugar; and the joints are about a foot and a half distant. The increase is upwards of five hundred fold. Upon a large scale, the seed may be drilled in alleys like peas; and, to save digging, the ground may be ploughed and harrowed, which will answer very well. It will grow upon all kinds of land. The ears which grow upon dry sandy land are less, but harder and riper. The grain is taken from the husk by hand, and when ground upon French stones, makes an excellent flour, of which it yields much more, with much less bran, than wheat does, and exceeds it in crust, pancakes, puddings, and all other uses except bread; but a sweetness peculiar to it, which in all other cases makes it agreeable, is here nauseous. It is excellent for feeding poultry and hogs, and fattens both much better and sooner than peas or barley. The stems make better hedges for kitchen gardens than reeds do. It clears the ground from weeds, and makes a good season for any other kind of corn. Piso, and other Spanish physicians, are full of the medicinal virtues of this grain. It was the only bread-corn known in America when first discovered by the Spaniards, and is there called maize.

Diseases of wheat.

Wheat is subject to more diseases than other grains, and, in some seasons, especially in wet ones, heavier losses are sustained from those diseases, than are felt in the culture of any other culmiferous crop with which we are acquainted. Wheat may suffer from the attack of insects at the root; from blight, which, primarily affects the leaf or straw, and ultimately deprives the grain of sufficient nourishment; from mildew on the ear, which operates thereon with the force of an apoplectic stroke; and from gum of different shades, which lodges on the chaff or cups in which the grain is deposited.

Blight.

Blight originates from moist or foggy weather, and from hoar-frost, the effects of which, when expelled by a hot sun, are first discernible on the straw, and afterwards on the ear, in a greater or lesss degree, according to local circumstances. Let a field be examined in a day or two after such weather, and a careful observer will soon be satisfied, that the fibres and leaves of the plants are contracted and enfeebled, in consequence of what may be called a stoppage of perspiration. This disorder may take place either earlier or later, but is most fatal when it appears at the time the grain is forming in the ear. It may appear at an earlier stage; though the productive powers of the plant will thereby be lessened, yet, if circumstances are afterwards favourable, the quality of the grain produced may not be much impaired; or it may appear after the grain is fully formed, and then very little damage will be sustained, except by the straw.

Mildew.

Mildew may be ranked as a disease which affects the ear, and is brought on by causes somewhat similar to those which occasion blight, though at a more advanced period of the season. If this disorder comes on immediately after the first appearance of the ear, the straw will also be affected; but if the grain is nearly or fully formed, then injury on the straw is not much discernible. We have seen a crop which carried wheat that was mildewed, where the straw was perfectly fresh, though, indeed, this rarely happens. A severe mildew, however, effectually prevents both corn and straw from making any further progress, the whole plant apparently going backward every day, till existence in a manner ceases altogether. Something akin to mildew is the gum or red oaker, which, in all warm moist seasons, attaches itself to the ear and often occasions considerable damage. All these different disorders are generally accompanied by insects; which animalculæ, by many people who take the effect for the cause, are considered, though without the least foundation, as the authors of the mischief that follows. Their appearance, however, may justly be attributed to the diseased state of the plant; for wherever putrefaction takes place, either in animal or vegetable substances, the presence of these insects will never be wanting.

Rust.

Another disorder which affects wheat, and by several people donominated the real rust, is brought on by excessive heats, which occasion the plants to suffer from a privation of nourishment, and become sickly and feeble. In this atrophical state, a kind of dust gathers on the stalk and leaves, which increases with the disease, till the plant is in a great measure worn out and exhausted. The only remedy in this case, and it is one that cannot easily be administered by the hand of man, is a plentiful supply of moisture, by which, if it is received before consumption is too far advanced, the crop is benefited in a degree proportional to the extent of nourishment received, and the stage at which the disease has arrived.

Impropriety of sowing mildewed wheat.

Some people have recommended the sowing of blighted and mildewed wheat, because it will vegetate; though certainly the recommendation, if carried into practice, would be attended with imminent danger to those who attempted it. That light or defective wheat will vegetate and produce a plant, we are not disposed to contradict; but that it will vegetate as briskly, or put out a stem of equal strength, and capable of withstanding the severe winter blasts, as those produced from sound seed, we must be excused for not believing. Let it only be considered, that a plant of young wheat, unless when very early sown, lives three or four months, in a great measure, upon the nourishment which it derives from the parent seed; and that such nourishment can, in no view of the subject, be so great when the parent is lean and emaciated, as when sound, healthy, and vigorous. Let it also be remembered, that a plant produced from the best and weightiest seed, must, in every case, under a parity of other circumstances, have a stronger constitution at the outset which necessarily qualifies it to push on with greater energy when the season of growth arrives. Indeed, the economy of nature would be overturned, had any other result followed. A breeder of cattle or sheep would not act more foolishly, who trusted that a deformed diminutive bull or ram would produce him good stock, than the corn farmer does who uses unsound or imperfect seed.

To remove the mildew on wheat.

A solution of common salt in water, in the proportion of a pound to a gallon, is an excellent remedy for the mildew on corn. After sprinkling three or four days, the mildew will disappear, leaving only a discolouration on the straw where it was destroyed. The best and most expeditious way of applying the mixture is with a flat brush, such as is used by white washers. The operator having a pail of the mixture in one hand, with the other he dips the brush into it, and makes his regular casts as when sowing corn broad-cast; in this way he will readily get over ten acres in the day, and with an assistant a great deal more. About two hogsheads of the mixture will suffice for an acre. Wherever the mixture touches, the mildew immediately dies.

To prevent mildew in wheat.

Dissolve 3 ounces and 2 drachms of sulphate of copper, copperas, or blue vitriol, in 3 gallons and 3 quarts, wine measure, of cold water, for every three bushels of grain that is to be prepared. Into another vessel capable of containing from 53 to 79 gallons, throw from 3 to 4 Winchester bushels of wheat, into which the prepared liquid is poured, until it rises 5 or 6 inches above the corn. Stir it thoroughly; and carefully remove all that swims on the surface. After it has remained half an hour in the preparation, throw the wheat into a basket that will allow the water to escape, but not the grain. It ought then to be immediately washed in rain, or pure water, which will prevent any risk of its injuring the germ, and afterwards the seed ought to be dried before it is sown. It may be preserved in this shape for months.—*Farmer's Mag.* 1815.

To prevent the smut in wheat.

Liming the seed by immersion is recommended by a French writer, as the only preventive warranted by science and sanctioned by experience, and the following is given as the method in which the process is best performed:

To destroy the germs of the blight in 4 1-2 bushels or 256 lbs. of corn, about 6 or 7 gallons of water must be used, as grain may be more or less dry, and from 35 to 42 ounces avoirdupois of quick lime, according as it may be more or less caustic, and according as the seed may have more or less of the blight. Boil part of the water, slack the lime with it; and then add the rest. When joined, the heat of the water should be such, that the hand can with difficulty bear it. Pour the lime water upon the corn placed in a tub, stirring it incessantly, first with a stick, and afterwards with a shovel. The liquid should, at first, cover the wheat, three or four fingers' breadth; it will soon be absorbed by the grain. In this state let it remain covered over for 24 hours, but turn it over 5 or 6 times during the day. Such parts of the liquor as will drain off, may then be separated, when the corn, after standing a few hours, in order that it may run freely out of the hand, may be sown. If not intended to be used immediately, the limed wheat should be put in a heap, and moved once or twice a day till dry. Experience has proved that limed grain germinates sooner than unlimed; and as it carries with it moisture sufficient to develop the embryo, the seed will not suffer for want of rain; insects will not attack it, the acrid taste of the lime being offensive to them; and as every grain germinates, a less quantity is requisite. In fact, the grain being swelled, the sower filling his hand as usual, will, when he has sown 65 handsful of limed corn, have, in reality, only used 52. As blighted grains preserve, for a long time, the power of germinating, the careful farmer, whose grain has been touched, should carefully sweep out the crevices in the walls, and cracks in the floors of his barn, and take great pains to clean them thoroughly.

Another method.

A tub is used that has a hole at bottom, for a spigot and faucet, fixed in a wisp of straw, to prevent any small pieces of lime passing (as in brewing.) To 70 gallons of water, add a corn bushel of unslaked lime, stir it well till the whole is mixed, let it stand 30 hours, run it off into another tub as clear as possible (as practised in beer;) add 42 pounds of salt, which, with stirring, will soon dissolve; this is a proper pickle for brining and liming seed-wheat without any obstacle, and greatly facilitates the drilling.

Steep the wheat in a broad bottomed basket, twenty-four inches diameter, and twenty inches deep, running in the grain gradually in small quantities, from 10 to 12 gallons: stirring the same. What floats, skim off, and do not sow; then draw up the basket, to drain the pickle, for a few minutes; this may be performed in half an hour, and when sufficiently pickled, proceed as before. The wheat will be fit for sowing in 24 hours, if required; but for drilling, two hours pickled will be best; and prepared four or five days before.

Mr. Henderson's method of preventing smut in wheat.

Take of best soft green soap made from fish-oil, 1 pound, and of scalding water, 4 gallons. Put the soap into a glazed vessel, with a small portion of the water; continue stirring it, and add the water as it dissolves, till the whole is a perfect ley. It should be used about 90 deg. of Fahrenheit's thermometer, or new-milk heat. Put the wheat into a tub, and pour on it a quantity of the liquor sufficient to cover it completely, and throw a blanket over it to preserve the heat. Stir it every ten minutes, and take off the scum. When it has remained in this manner for an hour, drain the liquor from the wheat through a sieve, or let the tub be furnished with a drain bottom like a brewing vat. Let the liquor which was drawn off stand a few minutes to subside, and then pour it off the sediment. Repeat the operation till the whole quantity is steeped; only observe to add, each time, as much hot ley as was observed by the former steeping. Dry the wheat with quick lime, and sow as soon as convenient. It will keep ten days after steeping; but should be spread thin on a dry floor.

Three pounds of soap, and 12 gallons of water, will steep half a ball of wheat. If a tub with a drain-bottom is used, such as a hogshead, with a spigot to draw off the ley, 4 ounces of soap, and 1 gallon of water scalding hot, will preserve a stock of warm ley sufficient for any quantity of wheat; and, allowing 5 minutes for draining, five balls may be done in 11 hours. The operation should be performed in a clean place, at a distance from barns and granaries, the roofs of which may be observed hanging full of smut. The refuse of smutted wheat should be buried deep in the earth, and not thrown to the dung-hill, from which it would be conveyed to the field. —*Farmer's Mag.* 1816.

Advantages of reaping corn before perfectly ripe.

M. Cadet de Vaux has lately recommended, as an important and useful innovation, the reaping of corn before it is perfectly ripe. This practice originated with M. Salles, of the Agricultural Society of Beziers: grain thus reaped (say eight days before it is ripe) is fuller, larger, finer, and is never attacked by the weevil. This was proved by reaping one half of a piece of corn-field as recommended, and leaving the other till the usual time. The early reaped portion gave a hectclitre (about 3 bushels) of corn more for an acre of land, than the later-reaped. An equal quantity of flour from each was made into bread; that made from the corn reaped green gave seven pounds of bread more than the other, in two bushels. The weevil attacked the ripe corn, but not the green. The proper time for reaping is when the grain, pressed between the fingers, has a doughy appearance, like bread just hot from the oven, when pressed in the same way.

To manage the wheat harvest.

It is advantageous to cut wheat before it is fully ripe; but, in ascertaining the proper state, it is necessary to discriminate between the ripeness of the straw and the ripeness of the grain; for, in some seasons the straw dies upwards, under which circumstance, a field, to the eye, may appear to be completely fit for the sickle, when, in reality, the grain is imperfectly consolidated, and perhaps not much removed from a milky state. Though it is obvious that under such circumstances, no further benefit can be conveyed from the root, and that nourishment is withheld the moment that the roots die: yet it does not follow that grain so circumstanced should be immediately cut; because, after that operation is performed, it is in a great measure necessarily deprived of every benefit from the sun and air, both of which have greater influence in bringing it to maturity, so long as it remains on foot, than when cut down, whether laid on the ground, or bound up in sheaves. The state of the weather at the time also deserves notice; for, in moist, or even variable weather, every kind of grain, when cut prematurely, is more exposed to damage than when completely ripened. All these things will be studied by the skilful husbandman, who will also take into consideration the dangers which may follow, were he to permit his wheat crop to remain uncut till completely ripened. The danger from wind will not be lost sight of, especially if the season of the equinox approaches; even the quantity dropped in the field, and in the stack-yard, when wheat is over ripe, is an object of consideration. Taking all these things into view, it seems prudent to have wheat cut before it is fully ripe, as less damage will be sustained from acting in this way than by adopting a contrary practice.

If the weather be dry, and the straw clean, wheat may be carted to the stack-yard in a few days; indeed, if quite ripe, it may be stacked immediately from the sickle, especially when not meant for early thrashing. So long, however, as any moisture remains in the straw, the field will be found to be the best stackyard; and where grass or weeds of any kind are mixed with the crop, patience must be exerted till they are decayed and dried, lest heating be occasioned.

Barley.

Next to wheat, the most valuable grain is barley, especially on light and sharp soils.

It is a tender grain, and easily hurt in any of the stages of its growth, particularly at seed time: a heavy shower of rain will then almost ruin a crop on the best-prepared land; and in all the after-processes, greater pains and attention are required to ensure success, than in the case of other grains. The harvest process is difficult, and often attended with danger; even the thrashing of it is not easily executed with machines, because the awn generally adheres to the grain, and renders separation from the straw a troublesome task. Barley, in fact, is raised at greater expense than wheat, and generally speaking, is a more hazardous crop. Except upon rich and genial soils, where climate will allow wheat to be perfectly reared, it ought not to be cultivated.

Varieties of barley.

Barley may be divided into two sorts, early and late; to which may be added a bastard variety called bear, or bigg, which affords similar nutriment or substance, though of inferior quality. Early barley, under various names, was formerly sown, in Britain, upon lands that had been previously summer fallowed, or were in high condition; but this mode of culture being in a great measure renounced, the common sort, which admits of being sown either early or late, is now generally used.

The most proper seed-season is any time in April, though we have seen good crops produced, the seed of which was sown at a much later period.

To prepare the ground.

Barley is chiefly taken after turnips, sometimes after peas and beans, but rarely, by good farmers, either after wheat or oats, unless under special circumstances. When sown after turnips, it is generally taken with one furrow, which is given as fast as the turnips are consumed, the ground thus receiving much benefit from the spring frosts. But often two or more furrows are necessary for the fields last consumed; because, when a spring drought sets in, the surface, from being poached by the removal or consumption of the crop, gets so hardened as to render a greater quantity of ploughing, harrowing, and rolling necessary, than would otherwise be called for. When sown after beans and peas, one winter and one spring ploughing are usually bestowed: but, when after wheat or oats, three ploughings are necessary, so that the ground may be put in proper condition. These operations are very ticklish in a wet and backward season, and rarely in that case is the grower paid for the expense of his labour. Where land is in such a situation as to require three ploughings, before it can be seeded with barley, it is better to summer fallow it at once, than to run the risks which seldom fail to accompany a quantity of spring labour. If the weather be dry, moisture is lost during the different processes, and an imperfect braird necessarily follows: if it be wet, the benefit of ploughing is lost, and all the evils of a wet seed-time are sustained by the future crop.

Quantity of seed.

The quantity sown is different in different cases, according to the quality of the soil and other circumstances. Upon very rich lands, eight pecks per acre are sometimes sown; twelve is very common; and, upon poor land, more is sometimes given.

By good judges a quantity of seed is sown sufficient to insure a full crop, without depending on its sending out offsets; indeed, where that is done, few offsets are produced, the crop grows and ripens equally, and the grain is uniformly good.

Mr. M'Cartney's invention for hummelling barley.

This invention is extremely simple and the cost only 3*s*. It is a bit of notched stick or bar, lined on one side with a thin plate of iron, and just the length of the rollers, fixed by a screw-bolt at each end to the inside of the cover of the drum, about the middle of it, so as the edge of the said notched stick is about one-eighth of an inch from the arms of the drum as it goes round. Two minutes are sufficient to put it on, when its operation is wanted; which is when putting through the bear the second time; and it is as easily taken off. It rubs off the awns or spikes to admiration; and by putting the grain another time through the mill, it will rub the husk off the ends of the pickle so entirely, that is unnecessary to sow it afterwards.

To harvest barley.

More care is required in the harvesting of barley, than any of the other white crops, even in the best of seasons; and in bad years it is often found very difficult to save it. Owing to the brittleness of the straw, after it has reached a certain period, it must be cut down; as, when it is suffered to stand longer, much loss is sustained by the breaking of the heads. On that account, it is cut at a time when the grain is soft, and the straw retains a great proportion of its natural juices, consequently requires a long time in the field, before either the grain is hardened, or the straw sufficiently dry. When put into the stack sooner, it is apt to heat, and much loss is frequently sustained. It is a custom with many farmers to have an opening in the middle of their barley stacks, from top to bottom. This opening is generally made by placing a large bundle of straw in the centre of the stack, when the building commences, and, in proportion as it rises, the straw is drawn upwards, leaving a hollow behind; which, if one or two openings are left in the side of the stack near the bottom, insures so complete a circulation of air as not only to prevent heating, but to preserve the grain from becoming musty.

Varieties of oats.

Of this grain the varieties are more numerous than of any other of the culmiferous tribe. These varieties consist of what is called the common oat; the Angus oat, which is considered as an improved variety of the other; the Poland oat; the Friesland oat; the red oat; the dun oat; the Tartar, or Siberian oat; and the potatoe oat. The Poland and potatoe varieties are best adapted to rich soils; the red oat for late climates; and the other varieties for the generality of soils, of which the Britsh isles are composed. The Tartar, or Siberian kind, though very hardy and prolific, is much out of use, being of a coarse substance, and unproductive of meal. The dun oat has never been much cultivated, and the use of Poland's and Friesland's is now much circumscribed, since potatoe oats were introduced, the latter being considered, by the most discerning agriculturists, as of superior value, in every respect, where the soil is rich and properly cultivated.

To prepare the ground.

Oats are chiefly sown after grass; sometimes upon land not rich enough for wheat, that had been previously summer fallowed, or had carried turnips; often after barley, and rarely after wheat, unless cross-cropping, from particular circumstances, becomes a necessary evil. One ploughing is generally given to the grass lands, usually in the month of January, so that the benefit of frost may be gained, and the land sufficiently mellowed for receiving the harrow. In some cases a spring furrow is given, when oats succeed wheat or barley, especially when grass seeds are to accompany the crop. The best oats, both in quantity and quality, are always those which succeed grass; indeed, no kind of grain seems better qualified by nature for foraging upon grass land than oats; as a full crop is usually obtained in the first instance, and the land left in good order for succeeding ones.

Quantity of seed.

From twelve to eighteen pecks of seed is generally allowed to the Scottish acre of ground, according to the richness of the soil, and the variety that is cultivated. Here it may be remarked, that land sown with potatoe oats, requires much less seed, in point of measure, than when any of the other sorts are used: because potatoe oats both tiller well, much better than Poland ones, and have not an awn or tail, like the ordinary varieties. On that account, a measure contains many more seeds of them than of any other kind. If land is equally well cultivated, there is little doubt but that the like quantity of seed given when barley is cultivated, may be safely trusted to when potatoe oats are to be raised.

To harvest oats.

Oats are a hardy grain, and rarely get much damage when under the harvest process, except from high winds or from shedding, when opened out after being thoroughly wetted. The early varieties are much more liable to these losses than the late ones, because the grain parts more easily from the straw, an evil to which the best of grain is at all times subject. Early oats, however, may be cut a little quick, which, to a certain extent, lessens the danger to which they are exposed from high winds; and if the sheaves be made small, the danger from shedding after rains is considerably lessened, because they are thus sooner ready for the stack. Under every management, however, a greater quantity of early oats will be lost during the harvest process than of late ones; because the latter adhere firmly to the straw, and consequently do not drop so easily as the former.

To cultivate rye.

Rye ought never to be sown on wet soils, nor even upon sandy soils where the sub-soil is of a retentive nature. Upon downs, links, and all soft lands, which have received manure, this grain thrives in perfection, and, if once covered in, will stand a drought afterwards, that would consume any of the culmiferous tribe. The several processes may be regarded as nearly the same with those recommended for wheat, with the single exception of pickling, which rye does not require. Rye may be sown either in winter or spring, though the winter-seeded fields are generally bulkiest and most productive. It may succeed either summer fallow, clover, or turnips; even after oats, good crops have been raised, and where such crops are raised, the land will always be found in good condition.

To cultivate beans.

Beans naturally succeed a culmiferous crop; and we believe it is not of much importance which of the varieties are followed, provided the ground is in decent order, and not worn out by the previous crop. The furrow ought to be given early in winter, and as deep as possible, that the earth may be sufficiently loosened, and room afforded for the roots of the plant to search for the requisite nourishment. The first furrow is usually given across the field, which is the best method when only one spring furrow is intended; but as it is now ascertained, that two spring furrows are highly advantageous, the one in winter ought to be given in length, which lays the ground in a better situation for resisting the rains, and renders it sooner dry in spring, than can be the case when ploughed across. On the supposition, that three furrows are to be given, one in winter, and two in spring, the following is the most eligible preparation.

Approved modes of drilling.

The land being ploughed in length as early in winter as is practicable, and the gaw and headland furrows sufficiently digged out, take the second furrow across the first as soon as the ground is dry enough in spring to undergo the operation; water-furrow it immediately, and dig again the gaw and head-land furrows, otherwise the benefit of the second furrow may be lost. This being done, leave the field for some days, till it is sufficiently dry, when a cast of the harrows becomes necessary, so that the surface may be levelled. Then enter with the ploughs, and form the drills, which are generally made up with an interval of 27 inches. In the hollow of this interval, deposit the seed by a drill-barrow, and reverse or slit out the drills to cover the seed, which finishes the process for the time. In ten or twelve days afterwards, according to the state of the weather, cross harrow the drills, thereby levelling the field for the hoeing process. Water-furrow the whole in a neat manner, and spade and shovel the gaw and the head-land furrows, which concludes the whole process.

This is the most approved way of drilling beans. The next best is to give only one spring furrow, and to run the drill-barrow after every third plough, in which way the intervals are nearly of the same extent as already mentioned. Harrowing is afterwards required, before the young plants reach the surface, and water-furrowing, &c. as above described.

Dung is often given to beans, especially when they succeed wheat, which had not received manure. The best way is to apply the dung on the stubble before the winter furrow is given, which greatly facilitates the after process. Used in this way, a fore stock must be in hand; but where the farmer is not so well provided, spring dunging becomes necessary, though evidently of less advantage. At that season, it may either be put into the drills before the seed is sown, or spread upon the surface and ploughed down, according to the nature of the drilling process, which is meant to be adopted. Land dunged to beans, if duly hoed, is always in high order for carrying a crop of wheat in succession. Perhaps better wheat, both in respect of quantity and quality, may be cultivated in this way, than in any other mode of sowing.

Drilling machines.

Different machines have been invented for drilling beans: but the most common and handy is one of the barrow form. This hand drill is pushed forward by a man or woman, and will, according as the brush or director is lowered or heightened, sow thicker or thinner, as may be expedient and necessary. Another machine, drawn by a horse, and sowing 3 drills at a time, has been constructed, and, upon flat lands, will certainly distribute the seed with the most minute exactness. Upon unequal fields, and even on those laid out in high ridges, the use of this machine is attended with a degree of inconvenience sufficient to balance its advantages. The hand-drill, therefore, in all probability, will be retained for general use, though the other is capable of performing the work with minuter regularity.

Quantity of seed.

Less than 4 bushels ought not to be hazarded, if a full crop is expected. We seldom have seen thin beans turn out well, unless the soil is particularly rich: nay, unless the rows close, weeds will get away after the cleaning process is finished, thereby disappointing the object of drilling, and rendering the system of little avail towards keeping the ground in good condition.

Hoeing process.

Beans are cleaned in various ways; 1st. By the hand hoe. 2nd. By the scraper, or Dutch-hoe. 3d. By a plough of small dimensions, but constructed upon the principles of the approved swing plough. Ploughs with double mould-boards are likewise used to earth them up; and, with all good managers, the weeds in the drills, which cannot be touched by the hoe, are pulled out by the hand, otherwise no field can be considered as duly cleaned.

In treating of the cleaning process, we shall confine ourselves to the one most suited to the generality of bean soils. About ten or twelve days after the young plants have appeared above the surface, enter with the scraper, and loosen any weeds that may have vegetated. At this time, the wings, or cutters, of the implement ought to be particularly sharp, so that the scraper may not run too deep, and throw the earth upon the plants. In about ten days after the ground is scraped, according to the state of the weather, and other circumstances, use the small swing plough to lay the earth away from the sides of the rows; and, in doing so, go as near to the plants as possible, taking care, at the same time, not to loosen their roots. If any weeds stand in the rows, pull them out with the hand; afterwards earth-up the plants with the small swing plough, or run the scraper in the intervals, as may seem expedient.

To manage the harvest.

Before beans are cut, the grain ought to be tolerably well ripened, otherwise the quality is impaired, whilst a long time is required to put the straw in such a condition as to be preserved in the stack. In an early harvest, or where the crop is not weighty, it is an easy matter to get beans sufficiently ripened; but in a late harvest, and in every one where the crop takes on a second growth, it is scarcely practicable to get them thoroughly ripened for the sickle. Under these circumstances, it is unnecessary to let beans stand uncut after the end of September or the first of October; because any benefit that can be gained afterwards, is not to be compared with the disadvantages that accompany a late wheat seed time. Beans are usually cut with the sickle, and tied in sheaves, either with straw ropes, or with ropes made from peas sown along with them. It is proper to let the sheaves lie untied several days, so that the winding process may be hastened, and, when tied, to set them up on end, in order that full benefit from air may be obtained, and the grain kept off the ground. In building bean stacks, it is an useful measure, for preserving both grain and straw from injury, to keep an opening in the centre, and to convey air from the extremity by a bole, or funnel. Beans, on the whole, are a troublesome crop to the farmer, though of great utility in other respects. Without them heavy soils can scarcely be managed with advantage, unless summer fallow is resorted to once in four years; but, by the aid derived from drilled beans, summer fallow may be avoided for eight years, whilst the ground, at that period, will be found in equal, if not superior condition.

To cultivate pease.

Pease are partially sown with beans to great advantage; and, when cultivated in this way, the same system of preparation, &c. described under the head of beans, is to be adopted. Indeed, upon many soils not deep enough for beans, a mixture of pease to the extent of one-third the seed sown proves highly advantageous. The beans serve as stabs or props to the pease, and the latter, being thus kept off the ground, and furnished with air and other atmospherical nutriment, blossom and pod with much greater effect than when sown according to the broad-cast system.

Pease agree well with lime and other calcareous stimulants, and can hardly be reaped in perfection where these are wanting. The varieties cultivated are numerous; but those adapted to field culture may be divided into two kinds, namely, early and late, though these branch out again into several varieties. We have white peas both early and late, and likewise grey peas, possessed of similar properties. The nomenclature is entirely arbitrary, and therefore not to be illustrated. As a general rule, the best seed time for late pease is either in February or March, though early ones, such as the Hasting, or Magpiehill pea, may be sown successfully after the 1st of May.

Pease ought to be sown tolerably thick so that the ground may be covered as early as possible.

To cultivate tares.

The tare is a plant of a hardy growth, and when sown upon rich land will return a large supply of green fodder, for the consumption of horses, or for fattening cattle. When intended for this use, the seed ought to be sown tolerably thick, perhaps to the extent of four bushels per Scots acre, though, when intended to stand for seed, a less quantity is required; because otherwise the thickness of the crop will prevent the plants from blossoming and podding in a sufficient way. When meant for seed, early sowing ought to be studied, otherwise the return will be imperfect; but when for green food, any time betwixt the first of April and the latter end of May will answer well, provided crops in succession from the first to the last mentioned period be regularly cultivated. Instances are not wanting of a full crop being obtained even when the seed was sown so late as the middle of June, though sowing so late is a practice not to be recommended. After the seed is sown, and the land carefully harrowed, a light roller ought to be drawn across, so that the surface may be smoothed, and the scythe permitted to work without interruption. It is proper also to guard the field for several days against the depredations of pigeons, who are remarkably fond of tares, and will pick up a great part of the seed, unless constantly watched.

Horses thrive very well upon tares, even better than they do upon clover and rye grass; and the same remark is applicable to fattening cattle, who feed faster upon this article of green fodder than upon any kind of grass, or esculent, with which we are acquainted. Danger often arises from their eating too many, especially when podded; as colics, and other stomach disorders, are apt to be produced by the excessive loads which they devour.

Potatoes.

Potatoes, as an article of human food, are, next to wheat, of the greatest importance in the eye of a political economist. From no other crop that can be cultivated will the public derive so much food as from this valuable esculent; and it admits of demonstration, that an acre of potatoes will feed double the number of people that can be fed from an acre of wheat. Potatoes are also a nourishing and healthy food, relished almost by every palate; and without them it is believed there is hardly a dinner served up for six months of the year in any part of the kingdom.

To prepare the ground.

To work the gronnd till it is completely reduced and free from root weeds, may be considered as a desideratum in potatoe husbandry; though in many seasons these operations cannot be perfectly executed, without losing the proper time for planting, which never ought to be beyond the first of May, if circumstances do not absolutely interdict it. Three ploughings, with frequent harrowings and rollings, are necessary in most cases before the land is in a suitable condition. When this is accomplished, form the drills as if they were for turnips; cart the manure, which ought not to be sparingly applied, plant the seed above the manure, reverse the drills for covering it and the seed, then harrow the drills in length, which completes the preparation and seed process.

Quantity of seed.

It is not advantageous to cut the seed into small slips; for the strength of the stem at the outset depends in direct proportion upon the vigour and power of the seed-plant. The seed-plant, therefore, ought to be large, rarely smaller than the fourth part of the potatoe; and if the seed is of small size, one half of the potatoe may be profitably used. At all events, rather err in giving over large seed than in making it too small; because, by the first error, no great loss can ever be sustained; whereas, by the other, a feeble and late crop may be the consequence. When the seed is properly cut, it requires from 10 to 12 hundred weight of potatoes to plant an acre of ground, where the rows are at 27 inches distance; but this quantity depends greatly upon the size of the potatoes used; if they are large, a greater weight may be required, but the extra quantity will be abundantly repaid by the superiority of crop which large seed usually produces.

Advantageous method of raising them.

The earth should be dug twelve inches deep, if the soil will allow; after this, a hole should be opened about six inches deep, and horse-dung, or long litter, should be put therein, about three inches thick; this hole should not be more than twelve inches diameter. Upon this dung or litter a potatoe should be planted whole, upon which a little more dung should be shaken, and then the earth should be put thereon. In like manner the whole plot of ground must be planted, taking care that the potatoes be at least sixteen inches apart. When the young shoots make their appearance, they should have fresh mould drawn round them with a hoe; and if the tender shoots are covered, it will prevent the frost from injuring them; they should again be earthed when the shoots make a second appearance, but not covered, as in all probability the season will be less severe.

A plentiful supply of mould should be given them, and the person who performs this business should never tread upon the plant, or the hillock that is raised round it, as the lighter the earth is, the more room the potatoe will have to expand.

A gentleman obtained from a single root, thus planted, very nearly forty pounds weight of large potatoes; and from almost every other root upon the same plot of ground, from fifteen to twenty pounds weight; and, except the soil be stony or gravelly, ten pounds, or a half peck, of potatoes may generally be obtained from each root, by pursuing the foregoing method.

But note—cuttings, or small sets will not do for this purpose.

Mode of taking up and storing the crop.

Potatoes are generally dug up with a three-prong grape, or fork; but at other times, when the weather is dry, the plough is used, which is the most expeditious implement. After gathering the interval, the furrow taken by the plough is broken and separated, in which way the crop may be more completely gathered than when taken up by the grape. The potatoes are then stored up for winter and spring use; and as it is of importance to keep them as long through summer as possible, every endeavour ought to be made to preserve them from frost, and from sprouting in the spring months. The former is accomplished by covering them well with straw when lodged in a house, and by a thick coat of earth, when deposited in a pit; and the latter, by picking them carefully, at different times, when they begin to sprout, drying them sufficiently by exposure to the sun, or by a gentle toast of a kiln.

Method of cultivating potatoes in Ireland.

The drill system, in the cultivation of potatoes in Ireland, is particularly recommended by Lord Farnham, in a letter to Sir John Sinclair. The small farmers, and labourers, plant them in lazy-beds, eight feet wide. This mode is practised on account of the want of necessary implements for practising the drill system, together with a want of horses for the same purpose.

They are cut into sets, three from a large potatoe: and each set to contain at least one eye. The sets are planted at the distance of seven inches asunder, 6 1-4 cwt. are considered sufficient seed for an English acre. Lord Farnham recommends rotten dung in preference to any fresh dung. If not to be procured, horse-dung, hot from the dung-hill. In any soil he would recommend the dung below the seed.

When the potatoes are vegetated ten inches above the surface, the scuffler must be introduced, and cast the mould from the potatoe. If any weeds are found in the drills, they must be hand-hoed; in three days afterwards they must be moulded up by the double-breasted plough, as high as the neck of the potatoe. This mode must be practised twice, or in some cases three times; particularly if the land is foul. I do not (says Lord Farnham) consider any mode so good as the drill system.

General observations.

To prepare for the drill system either oat or wheat stubble, it should be ploughed in October, or the beginning of November; to be ploughed deep and laid up for winter dry. In March let it be harrowed, and give it three clean earths. Be very particular to eradicate the couch grass. The drills to be three feet asunder; drill deep the first time that there is room in the bottom of the furrow to contain the dung. The best time to begin planting the potatoes, is about the latter end of April, by this system. It is as good a preparation for wheat as the best fallows.

Three feet and a half for drills, are preferable to four feet. Mr. Curwen prefers four feet and a half. He says the produce is immense. Potatoes ought to be cut at least from two to three weeks before being planted; and if planted very early, whole potatoes are preferable to cut ones, and dung under and over.

To produce early potatoes in great quantity.

Early potatoes may be produced in great quantity by resetting the plants, after taking off the ripe and large ones. A gentleman at Dumfries has replanted them six different times in one season, without any additional manure; and instead of falling off in quantity, gets a larger crop of ripe ones at every raising, than the former ones. His plants have still on them three distinct crops, and he supposes they may still continue to vegetate and germinate until they are stopped by the frost. By this means he has a new crop every eight days, and has had so for a length of time.

To grow potatoes constantly on the same piece of ground.

Let the cuttings be made from finest potatoes, instead of the smallest and worst, usually employed for the purpose; and it will be found, contrary to what is supposed by farmers, that they will not degenerate. The same will happen with respect to the seeds of the watery squash, early peas, and several other kinds of vegetables.

To preserve potatoes from frost.

This is best done by filling completely the place where they are deposited, whether it be a house or a pit, and allowing the place to remain shut during the winter. But this cannot be done easily with a potatoe-house, as it cannot be completely packed or filled like a pit. Besides, some potatoes are generally wanted daily; and thus air is admitted, and a greater vacuity constantly making, both which are very likely to be the means of proving injurious or destructive to what potatoes may be in the house, when a severe frost sets in. There is no such thing in nature as a vacuum; therefore, if a place is not filled with some substance or other, it will be filled with air. For this reason, pits are better for preserving potatoes from frost than a house, because a pit can be more effectually filled: and, by opening a pit when potatoes are wanted, and removing the whole into some part of a house, and still keeping over them a covering of straw, turf, or divot, the potatoes are kept close. A potatoe-house, however, is very useful, and what every farmer ought to have, as in this house he may still keep a small quantity of his crop for daily use, by emptying a pit occasionally, and keeping them always well covered with straw, as has been already mentioned.

The potatoe-house ought to be well plaistered with clay, and perfectly dry before using it.

Potatoe-pits should be made upon ground that has a southern exposure, a deep soil, and declining to a considerable distance from the pit. In a deep soil, the pits can be made sufficiently deep, before reaching any cold bottom; and the declivity carries away water. When the pits have been fully finished, and covered, a sod should be cut out all the way round the potatoes, and the cut continued a little way as the descent points out. A pit of about ten feet deep, six wide, and ten long, will hold from four to six cart loads of potatoes. The covering should consist of straw, fern, rushes, &c. next the potatoes, then the whole of the earth dug out should be thrown upon the heap; and, last of all, a covering of earth or divot, if done in the best way. This covering will be about two feet thick.

Another method.

The best and easiest way of preserving potatoes, is for the farmer to drive all his potatoes home, and to lay them upon dry ground, without breaking the surface, and as near the stables as possible; putting them in heaps of about three or four carts, then covering them with straw, and, above that, with turf, where it can be commanded, or with a neat thatching of straw. Then let a quantity of stable dung, of the roughest kind, and the newest, be laid upon each heap, to remain during the winter, but which must be removed in the spring. As the weather appears severe, the quantity of dung may be increased at pleasure. If this practice were adopted, few or no potatoes would be penetrated by the frost, as none would be in hazard, except one pit, or part of it, when it was removing, or placed in he potatoe-house, during the winter season.

To remove frost from pototoes.

The weather which soonest injures and destroys potatoes, is when the atmosphere is depressed with cold to such a degree that it congeals water; then potatoes, unless covered, will be frosted; and the cover proper to preserve them ought to be proportioned to the intenseness of the weather.

Potatoes when slightly frosted, so as to have acquired a slight sweet taste only, often, like an animal body suddenly infected by some disorder, which it throws off by perspiration, are found quite wet, throwing out the frost by a kind of perspiration. When they are in this state, in order to recover them, and bring them to a proper taste, the whole quantity infected should be turned over, and a quantity of mill seeds thrown among them, as they are turned over; this both extracts and absorbs the injured moisture from the body of the potatoes infected. But there is still a more powerful remedy than simply mixing them with mill-seeds; and that is, a small quantity of slaked lime, perfectly dry, mixed among the seeds to be used; which has a very wonderful effect in recovering potatoes that have been considerably injured by frost.

When frosted potatoes are to be used, either at the table, or given to horses, black cattle, or swine, plunging them in cold water, about half a day before using them, is of great advantage: and if put into running water, so much the better, as it has been proved to be more powerful in extracting the frost on account of its alterative quality and superior purity.

Another method.

Another way of removing frost from potatoes, when they are to be prepared for the table, is to strip them of their skins, and, if large, to cut them into two or more pieces; then to plunge them into cold water for a considerable time, with a handful of salt in the water; and, when put on to be boiled, put as much salt into the water as possible, not to make them too salt when boiled.

This is a powerful way of making the potatoe throw off the bad taste and spoiled quality lodged in its substance.

When prepared for horses, black cattle, and swine:—Salt, or salt-petre put among the potatoes, and boiled together, will destroy any injurious quality which frost has lodged or brought on. Chaff or oats, bruised in a mill, boiled with the frosted potatoes, when designed for horses or cattle, tends to destroy the bad effects of the frost.

Uses to which frosted potatoes may be beneficially applied.

When potatoes have acquired a disagreeable taste by means of frost, they will make good and wholesome bread, by boiling them, as has been mentioned, with salt, mashing or bruising them small, then kneading them together with oatmeal. Not less than two-thirds should consist of meal, which will destroy the sweet taste; and the dry and generous quality of the meal will effectually correct and destroy any thing noxious in the injured roots.

Horses, swine, dogs, &c. may all be fed with potatoes, though frosted, by boiling them, and mixing them with oats coarsely ground, or with oat-meal; always adding a good quantity of salt or salt-petre in the mixture. Poultry also may be fed with potatoes very much frosted, if mixed with oatmeal in about equal proportions, without salt, as this species of animal cannot admit of it.

Further uses of frosted potatoes.

Potatoes frosted, when three times distilled, produce a spirit from hydrometer proof to ten per cent. over proof; therefore a principal purpose and use to which they may be turned, is the making of ALCOHOL; more particularly as that article is useful for many purposes where strength is its principal recommendation. The ordinary strength that spirits are run, preparatory to converting them into alcohol, is from 40 to 50 per cent. over proof by Dicas; which, re-distilled from calcined carbonate of potash, will produce alcohol at 825, water being 1000.

When potatoes are frosted to such a degree as to be useless for food from their sweet taste, they are very useful to WEAVERS in dressing their yarn, particularly cotton. They are prepared for this purpose by boiling them well; then mash or beat them small; then put them into a vessel, adding a little barm, drippings of ale or porter-barrels: allowing them to stand two or three months to ferment.

SHOEMAKERS may use it also; only, as their paste requires more solidity and greater strength, flour is generally mixed along with the fermented potatoes, in about equal proportions.

BOOKBINDERS also may use this paste, alum being mixed to assist the strength of the composition. And it may be beneficially used by PAPER STAINERS, and UPHOLSTERERS, when made up with a mixture of flour and alum.

When potatoes are so penetrated with frost that they have become quite soft, they are useless for man or beast; but make excellent manure for light sharp soils; and for this purpose are worth about one-fifth, or sixth of their original value. In Berwickshire, and other places, where it is a great object to get their straw turned into dung, the value of the frosted potatoe is still greater, as it assists the farmer in that operation.

To make starch from frosted potatoes.

Potatoes much frosted, will make very good starch; though it is a shade darker in colour. All coarse cloths requiring to be stiffened, where whiteness is no object, may be done with starch made from potatoes greatly penetrated with frost. The best method of making potatoes into starch, is to grate them down among water, then to take out all the refuse with the hand, and next to strain the whole of the water in which the potatoes have been grated, through a thin cloth, rather coarse, or fine sieve, and afterwards frequently putting on and pouring off water, until it comes clear from the starch, which is always allowed to settle or fall to the bottom of the vessel in which the operation is performed. An experiment was tried with a few potatoes that were put out to frost. They were grated down, and made into starch powder: The produce of the fresh potatoe weighed 876 grains, while that of the frosted was only 412, being less than half the quantity.

The refuse of the potatoe, when taken from the sieve, possesses the property of cleansing woollen cloth without hurting their colours; and the water decanted from the starch powder is excellent for cleansing silks, without the smallest injury to their colour. In making hair-powder it has long been used, and is therefore well known.

Turnips.

The benefits derived from turnip husbandry are of great magnitude; light soils are cultivated with profit and facility; abundance of food is provided for man and beast; the earth is turned to the uses for which it is physically calculated: and by being suitably cleaned with this preparatory crop, a bed is provided for grass seeds, wherein they flourish and prosper with greater vigour than after any other preparation.

To prepare the ground.

The first ploughing is given immediately after harvest, or as soon as the wheat seed is finished, either in length or across the field, as circumstances may seem to require. In this state the ground remains till the oat seed is finished, when a second ploughing is given to it, usually in a contrary direction to the first. It is then repeatedly harrowed, often rolled between the harrowings, and every particle of root-weeds carefully picked off with the hand; a third ploughing is then bestowed, and the other operations are repeated. In this stage, if the ground has not been very foul, the seed process generally commences; but often a fourth ploughing, sometimes a fifth is necessary, before the ground is sufficiently clean. Less labour, however, is necessary now than in former times, when a more regular mode of cropping was commonly followed.

To sow the seed.

The next part of the process is the sowing of the seed; this, almost in every case since turnips were introduced into this country, has been performed by drilling machines, of different sizes and constructions, though all acting on the same principle. At this time, the machine is drawn by a horse in a pair of shafts, sows two drills at a time, and answers extremely well, where the ground is flat, and the drills properly made up. The weight of the machine insures a regularity of sowing hardly to be gained by those of a different size and construction. From two to three pounds of seed are sown upon the acre, though the smallest of these quantities will give many more plants, in ordinary seasons, than are necessary; but as the seed is not an expensive article, the greater part of farmers incline to sow thick, which both provides against the danger of part of the seed perishing, and gives the young plants an advantage at the outset.

Turnips are sown from the beginning to the end of June; but the second and third weeks of the month are, by judicious farmers, accounted the most proper time. Some people have sown as early as May, and with advantage; but these early fields are apt to run to seed before winter, especially if the autumn be favourable to vegetation. As a general rule, it may be laid down, that the earliest sowings should be on the latest soils; plants on such soils are often long before they make any great progress; and, in the end, may be far behind those in other situations, which were much later sown. The turnip plant, indeed, does not thrive rapidly till its roots reach the dung; and the previous nourishment afforded them is often so scanty as to stunt them altogether before they get so far.

Cleaning process.

The first thing to be done in this process is to run a horse-hoe, provincially termed a scraper, along the intervals, keeping at such a distance from the young plants that they shall not be injured; this operation destroys all the annual weeds which have sprung up, and leaves the plants standing in regular stripes or rows. The hand-hoeing then commences, by which the turnips are all singled out, at a distance of from eight to twelve inches, and the redundant ones drawn into the spaces between the rows. The singling out of the young plants is an operation of great importance, for an error committed in this process can hardly be afterwards rectified. Boys and girls are always employed as hoers; but a steady and trusty man-servant is usually set over them, to see that the work be properly executed.

In eight or ten days, or such a length of time as circumstances may require, a horse-hoe of a different construction from the scraper is used. This, in fact, is generally a small plough, of the same kind with that commonly wrought, but of smaller dimensions. By this implement, the earth is pared away from the sides of the drills, and a sort of new ridge formed in the middle of the former interval. The hand-hoers are again set to work, and every weed and superfluous turnip is cut up; afterwards the horse-hoe is employed to separate the earth, which it formerly threw into the furrows, and lay it back to the sides of the drills. On dry lands this is done by the scraper; but where the least tendency to moisture prevails, the small plough is used, in order that the furrows may be perfectly cleaned out. This latter mode, indeed, is very generally practised.

To cultivate the yellow turnip.

This variety, as now cultivated in the field, is quite different from the yellow garden turnip, being larger in size, containing more juice, or nutritive substance, much easier cultivated, and preserving its powers till the middle of May, when the grass season may be expected. Upon ordinary soils it is superior to ruta baga, because it will grow to a considerable weight, where the other would be stunted or starved; and it stands the frost equally well. No farmer who keeps stock to any extent should be without it. The mode of culture required is in every respect similar to what is stated concerning common turnips, with these exceptions, that earlier sowing is necessary, and that the plants need not be set out so wide, as they do not swell to such a size.

Ruta baga, or Swedish turnip.

The process of management is precisely the same with that of turnips, with this addition, that more dung is required, and that seed time ought to be three or four weeks earlier. Rich soil, however, is required for this article: for it will not grow to any size worth while, on soils of middling quality, whatever quantity of dung may be applied.

Ruta baga is of great advantage in the feeding of horses, either when given raw or boiled, or with broken corn. If a sufficient quantity were cultivated, a great deal of grain might be saved, while the health and condition of the working stock would be greatly invigorated and augmented. An evening feed of this nutritious article would be of incalculable benefit; even most horses are fond of the common turnip in a raw state; and it is a subject well worthy of every farmer's attention, whether it would not be for his interest to raise these esculents in such a quantity as to serve them during the long period when grass cannot be obtained. That the health of the animals would thereby be benefited is unquestionable; and the saving of the grain would greatly exceed the trouble occasioned by furnishing a daily supply of these roots.

To destroy the fly on turnips.

Lime sown by the hand, or distributed by a machine, is an infallible protection to turnips against the ravages of the fly. It should be applied as soon as the turnips come up, and in the same daily rotation in which they were sown. The lime should be slaked immediately before it is used, if the air be not sufficiently moist to render that operation unnecessary.

Another method.

Let the farmer carefully watch his turnips as they come up, and whenever the fly makes its appearance, take a certain quantity of brimstone, about 2 1-2 or 3 lbs. to an acre; put this into a kettle, and melt it in the turnip field, in a situation the most eligible for the wind to carry the fume over the ground; then take any combustible matter calculated to make a considerable smoke, which being dipped in the liquid brimstone, must be strewed all over the field in a state of ignition, and so close together that the fumes of the burning matter may completely cover every part of the ground. The decoction of the bitter almond is more fatal to the lives of insects and worms than any other vegetable or mineral poison. It is made by infusing the bitter almond powder (the ground cakes that remain after expressing the oil) in warm water for 24 hours; 28 lbs. (which may be purchased for 5*s.*) will make 40 gallons, a sufficient quantity for a large garden.

Remedy against the bite of the turnip fly.

It is upon the principle of creating an offensive smell that turnip seed is recommended to be steeped in train oil before it is sown. This has been found to be a perfect security against the bite of the turnip fly.

To prevent the fly in turnips.

Sow good and fresh seed in well manured and well prepared ground.

To prevent the increase of pismires in grass lands newly laid down.

Make a strong decoction of walnut-tree leaves, and after opening several of the pismire's sandy habitations, pour upon them a quantity of the liquor, just sufficient to fill the hollow of each heap; after the middle has been scooped, throw in the contents from the sides, and press down the whole mass with the foot, till it becomes level with the rest of the field. This, if not found effectual at first, must be repeated a second or a third time, when they infalliby will be destroyed.

To prevent growing crops from the devastation of vermin.

The good effects of elder in preserving plants from insects and flies, are experienced in the following cases:—

1. For preventing cabbage and cauliflower plants from being devoured and damaged by caterpillars.

2. For preventing blights and their effects on fruit-trees.

3. For preserving corn from yellow flies and other insects.

4. For securing turnips from the ravages of flies.

The dwarf elder appears to exhale a much more fœtid smell than the common elder, and, therefore should be preferred.

To check the ravages of the turnip fly.

Suppose that the farmer has no objection to bestown 5 lbs. of seed per acre, in order to secure his crop of turnips. If he sows broad-cast, let him medicate one half of the seeds, in the manner to be afterwards explained, leaving the other half unprepared, The latter may be sown one day, and the medicated a day or two after, so as to give a start to the other.

The medicated will, in that case, escape from the attacks of the fly or beetle. If the slug, however, does appear, rolling in the night is necessary. If the farmer drills his turnips, after the land is prepared for the drill 2 1-2 lbs. of the unmedicated seed should be sown broad-cast, and a day or two afterwards the medicated seed sown in the drills. In this way a crop may be obtained at least by the industrious farmer, who does not grudge a little trouble to secure a good one. He will find that the plants sown broad-cast will give full employment to the fly, till the less savoury plants in the drill pass the moment of danger. As to preparing or medicating the seed, sulphur is so obnoxious to the whole insect tribe, and at the same time so favourable to vegetation, that it seems entitled to a preference. The turnip seed may be a little damped, and then mixed with the flour of sulphur, at the rate of two ounces of sulphur to one pound of seed; or let the seed be steeped in a liquor, formed by boiling three parts of lime to one of sulphur, and 100 parts of water. This steep is much approved of for all such purposes. It is not improbable that the same liquid in which wheat is commonly pickled would prove a preservative against the fly. It may be proper to add, that when the season is very dry, it has been found a most useful practice to moisten the dung well before it is inserted into the drill; to spread the dung very rapidly in the rows, and instantly to sow, at the rate of four pounds of turnip-seed per acre, upon the dung. The ground should then be gathered up into bouts, 27 inches wide, by the going and returning of the plough. The seeds are thus put in contact with the wet dung. Many perish, but a sufficient number escape to produce a good crop. In this case, the sowing any unmedicated seed broad-cast, may be dispensed with.

To cultivate san-foin.

Chalky loams and gravelly soils on a calcareous bottom are most proper for this grass. It is more adapted to hay than pasture; and much heavier crops of this grass are obtained from thin lands than when clover is sown. San-foin is a hardy kind of grass, well worth the attentiou of cultivators in upland districts, where the soil is obdurate and shallow, and where clover and rye-grass can with difficulty be raised to such a height as to stand the scythe. When sown, fresh seed ought constantly to be used, as the vegetation of old seed cannot be depended upon. Four bushels may be used for an acre; and great care ought to be taken to cover the seed well, and to put it deeper into the ground than the seeds of other grasses.

To preserve grain from vermin.

So preserve rye, and secure it from insects and rats, nothing more is necessary than not to winnow it after it is threshed, and to stow it in the granaries mixed with the chaff. In this state it has been kept for more than three years, without experiencing the smallest alterations, and even without the necessity of being turned, to preserve it from humidity and fermentation. Rats and mice may be prevented from entering the barn, by putting some wild vine or hedge plants upon the heaps: the smell of this wood is so offensive to these animals that they will not approach it.

To prevent the destruction of corn by insects.

In laying the floors of a granary, let Italian poplars be made use of for the timber. Many experiments show that granaries, after laying down this flooring, will no longer be infested with weevils, &c.

To destroy slugs upon wheat.

Collect a number of lean ducks; keep them all day without food, and turn them into the fields towards evening; each duck would devour the slugs much faster than a man could collect them, and they would soon get very fat for market.

To prevent the ravages of mice in corn stacks.

The following simple remedy against the depredations of mice in corn stacks, has lately been recommended for its undoubted efficacy.

Sprinkle from 4 to 6 bushels of dry white sand upon the root of the stack before the thatch is put on. The sand is no detriment to the corn, and stacks thus dressed have remained without injury. So very effective is the remedy, that nests of dead young mice have been found where the sand has been used, but not a live mouse could be seen.

To clear barns and out-houses from mites and weevils.

The following method is practised in Germany, for granaries infested with mites and weevils. Let the walls and rafters, above and below, of such granaries be covered completely with quick-lime slaked in water in which trefoil, wormwood, and hyssop, have been boiled. This composition should be applied as hot as possible. A farmer who had the granaries empty in June last, collected quantities of the largest sized ants in sacks, and scattered them about the places infested with weevils. The ants immediately fell upon and devoured them all.

To destroy slugs on land.

Procure some fresh lime, and after throwing as much water upon it as will reduce it to a powder, sow the lime in a hot state upon the land that is overrun with the vermin, at the rate of about 12 bushels to the acre. The lime should be sown towards the wind, and falling upon them in a fermented state, it will instantly kill them.

Usefulness of the hedgehog.

This little animal, the object of persecution, not only to little boys, but to the farmer, and game-keeper, on account of its supposed mischievous propensities, is in fact one which the agriculturist should endeavour to preserve; as it is the most effectual destroyer of snails, worms, and insects; and on which it almost entirely subsists. A garden in which a hedgehog is kept, will, in the course of two or three nights, be entirely freed from slugs, and that enemy to fruit, the millipede, is a favourite food to him. The London gardeners are so aware of this as often to purchase hedgehogs to put in their grounds. The opinion that this animal sucks cows is too absurd to require refutation. The mouth of the hedgehog is too small to lay hold of the teat of a cow, even if it could be believed by any reflecting person that she would suffer its sharp bristles to touch her; and if it ever has been found eating poultry or game, as has by some been asserted, they must previously have been killed by rats, weasles, or some more ferocious animal than the hedgehog, whose habits are those of gentleness and timidity, who is not formed for attack, and whose sole mode of defence is rolling itself up in a ball and opposing its strong prickles to the enemy. This statement is the result of two years' observation on the nature and mode of life of the hedgehog; and is given in the hope of rescuing a harmless and useful creature from the general abhorrence in which it is held, and the unmerciful treatment it meets with.

To destroy weeds.

To clear the ground of weeds is an operation no less necessary in husbandry, than the disposing it to produce vegetables of any kind in plenty.

Annual weeds, or such as spring from seed, and die the same year, are most easily destroyed. For this purpose, it will be sufficient to let them spring up till near the time of ripening their seed, and then plough them down before it comes to maturity. It is also of service to destroy such weeds as grow in borders, or neglected corners, and frequently scatter their seeds to a great distance; such as the thistle, dandelion, rag-weed, &c. for these are sufficient to propagate their species through a deal of ground, as their seeds are carried about with the wind to very considerable distances. A farmer ought also to take care, that the small seeds of weeds, separated from corn in winnowing, be not sown again upon the ground; for this certainly happens when they are thrown upon a dung hill; because, being the natural offspring of the earth; they are not easily destroyed. The best method of preventing any mischief from this cause is to burn them.

Perennial weeds are such as are propagated by the roots, and last for a number of years. They cannot be effectually destroyed, but by removing the roots from the ground, which is often a matter of some difficulty. The only method that can be depended upon in this case, is frequent ploughing, to render the ground as tender as possible; and harrowing with a particular kind of harrow, in order to collect these pernicious roots. When collected, the ought to be dried and burnt, as the only effectual methed of insuring their doing no farther mischief.

To destroy broom, furze, and thorns.

Besides those kinds of weeds, which are of an herbaceous nature, there are others which are woody, and grow to a very considerable size; such as broom, furze, and thorns. The first may be destroyed by frequent ploughing and harrowing, in the same manner as other perennial weeds are. Another method of destroying broom, is by pasturing the field where it grows with sheep.

The best method of extirpating furze, is to set fire to it in frosty weather; for frost has the effect of withering and making them burn readily. The stumps must then be cut over with a hatchet; and when the ground is well softened by rain, it may be ploughed up, and the roots taken out by a harrow adapted to that purpose. If the field is soon laid down to grass, they will again spring up; in this case, pasturing with sheep is an effectual remedy. The thorn, or bramble, can only be extirpated by ploughing up the ground, and collecting the roots.

Usefulness of moving weeds.

In the month of June weeds are in their most succulent state, and in this condition, after they have lain a few hours to wither, hungry cattle will eat greedily almost every species. There is scarcely a hedge, border, or a nook, but what at that season is valuable: and it certainly must be good management to embrace the transient opportunity: for in a few weeks they will become nuisances.

To banish crows from a field.

Machinery of various kinds, such as windmills in miniature, horse-rattles, &c. to be put in motion by the wind, are often employed to frighten crows: but with all of these, they soon become familiar; when they cease to be of any use whatever.

The most effectual method of banishing them from a field, as far as experience goes, is to combine with one or other of the scarecrows in vogue, the frequent use of the musket. Nothing strikes such terror into these sagacious animals, as the sight of a fowling piece, and the explosion of gunpowder, which they have known so often to be fatal to their race. Such is their dread of a fowling-piece, that if one is placed upon a dyke, or other eminence, it will for a long time prevent them from alighting on the adjacent grounds.

To cultivate carrots.

To command crops of this root, manure the land with 25 or 30 loads of dung per acre, pretty rotten; plough it in, and then cover the seed by harrowing. The dung neither injures the taste of the carrot, makes them grow deformed, nor causes the canker. A farmer's object is to produce as great a quantity as possible from every acre, which must undoubtedly be accomplished by manure. In confirmation of this opinion, the following statement is given:—

Unmanured carrots, sown March 31st, 1880.

	Ton.	Stone.
Roots	9 . . .	137 per acre.
Tops	4 . . .	24 do.

Manured after potatoes sown, April 7th, 1808.

	Ton.	Stone.
Roots	12 . . .	183 per acre.
Tops	5 . . .	71 do.

The soil in both were exactly the same; and the dung half rotten. The preceding crop had in both instances been potatoes, and the quality of the carrots was similar in both cases. An extensive collection of such well authenticated experiments are better calculated to extend the boundaries of agricultural knowledge, than all theories and mere reasonings upon them, yet published.

Mode of cultivating parsnips in Guernsey.

Although this root is cultivated in almost all the soils of that island, that is esteemed the best which consists of a good light loam, the deeper the better. If the loamy soil is not deep, the under soil at least should be opened, to allow of the free penetration of the roots.

If the land is not perfectly clear from couch grass and other weeds, it is pared with the paring-plough in October, and harrowed to remove the weeds. About the middle of February, the land is prepared for sowing by means of 2 ploughs. A small plough precedes, and opens the furrow to the depth of four inches, and is followed by a larger plough drawn by four or six oxen and as many horses, which deepens the furrow to ten or fourteen inches. As soon as the clods are capable of being broken, the harrowing commences, and is repeated till the soil is pulverized, and reduced nearly to the state of garden mould. The whole of the processes are intended to loosen the soil to as great a depth as possible.

The seed should not be more than a year old, as it is uncertain when of a greater age. It is sown broad-cast, and on a day just so windy as to insure its regular spreading over the surface. The seed is then covered by the harrow. The quantity sown is from 2 to 4 quarts.

As soon as the plants are sufficiently strong, they are hand-weeded and thinned, and this operation must be repeated at least three times during the summer. The distance between the plants is ultimately about nine inches; and to save a portion of the labour, a harrowing is sometimes given between the first and second weedings.

The first weeding is performed about the middle of May, and repeated when necessary, till the beginning of July.

The roots are dug up about the middle of August, when they are thought to be most nutritious, and to fatten animals better than after the leaves are decayed. The quantity dug up at this season is not more than is required for two or three day's consumption. It is only in October that the root is fully ripe, when it may be dug up with forks, and preserved dry in sheds during the winter; but it is usually left in the ground in Guernsey, where frost is rare, and taken up as it is wanted.

The parsnip is considered by the Guernsey farmers to be the most nutritious root known, superior even to the carrot and the potatoe. When small, it is given to the animals whole; but when large, it is sliced longitudinally. Hogs prefer this root to all others, and it makes excellent pork. Horses are equally fond of the parsnip, although from eating it with too much avidity it sometimes sticks in the throat. But this may easily be prevented by cutting the roots into pieces before they are given.

To cultivate hemp.

The soil.

The soils most suited to the culture of this plant, are those of the deep, black, putrid, vegetable kind, that are low, and rather inclined to moisture, and those of the deep, mellow, loamy, or sandy descriptions. The quantity of produce is generally much greater on the former than on the latter; but it is said to be greatly inferior in quality. It may, however, be grown with success on lands of a less rich and fertile kind, by proper care and attention in their culture and preparation.

To prepare the ground.

In order to render the grounds proper for the reception of the crop, they should be reduced into a fine mellow state of mould, and be perfectly cleared from weeds, by repeated ploughing. When it succeeds grain crops, the work is mostly accomplished by three ploughings, and as many harrowings: the first being given immediately after the preceding crop is removed, the second early in the spring, and the last, or seed earth, just before the seed is to be put in. In the last ploughing, well rotted manure, in the proportion of 15 or 20, or good compost, in the quantity of 25 or 33 horse cart loads; as without this it is seldom that good crops can be produced. The surface of the ground being left perfectly flat, and as free from furrows as possible; as by these means the moisture is more effectually retained, and the growth of the plants more fully promoted.

Quantity of seed, &c.

It is of much importance in the cultivation of hemp crops, that the seed be new, and of a good quality, which may in some measure be known by its feeling heavy in the hand, and being of a bright shining colour.

The proportion of seed, that is most commonly employed, is from two to three bushels, according to the quality of the land: but, as the crops are greatly injured by the plants standing too closely together, two bushels, or two and a half, may be a more advantageous quantity.

As the hemp plant is extremely tender in its early growth, care should be taken not to put the seed into the ground at so early a period, as that it may be liable to be injured by the effects of frost; nor to protract the sowing to so late a season, as that the quality of the produce may be affected. The best season, on the drier sorts of land, in the southern districts, is, as soon as possible after the frosts are over in April, and, on the same descriptions of soil, in the more northern ones, towards the close of the same month, or early in the ensuing one.

Method of sowing.

The most general method of putting crops of this sort into the soil is the broadcast, the seed being dispersed over the surface of the land in as even a manner as possible, and afterwards covered in by means of a very light harrowing. In many cases, however, especially where the crops are to stand for seed, the drill method in rows, at small distances, might be had recourse to with advantage; as, in this way the early growth of the plants would be more effectually promoted, and the land be kept in a more clean and perfect state of mould, which are circumstances of importance in such crops. In whatever method the seed is put in, care must constantly be taken to keep the birds from it for some time afterwards.

This sort of crop is frequently cultivated on the same pieces of ground for a great number of years, without any other kind of intervening; but, in such cases, manure must be applied with almost every crop, in pretty large proportions, to prevent the exhaustion that must otherwise take place. It may be sown after most sorts of grain crops, especially where the land possesses sufficient fertility, and is in a proper state of tillage.

After culture.

As hemp, from its tall growth and thick foliage, soon covers the surface of the land and prevents the rising of weeds, little attention is necessary after the seed has been put into the ground, especially where the broadcast method of sowing is practised; but, when put in by the drill machine, a hoeing or two may be had recourse to with advantage in the early growth of the crop.

In the culture of this plant, it is particularly necessary, that the same piece of land contains both male and female, or what is sometimes denominated simple hemp. The latter kind contains the seed.

When the crop is ripe, (which is known by its becoming of a whitish yellow colour, and a few of the leaves beginning to drop from the stems; this happens commonly about 13 or 14 weeks from the period of its being sown, according as the season may be dry or wet, the first sort being mostly ripe some weeks before the latter:) the next operation is that of taking it from the ground, which is effected by pulling it up by the roots, in small parcels at a time, by the hand, taking care to shake off the mould well from them before the handsful are laid down. In some districts, the whole crop is pulled together, without any distinction being made between the the different kinds of hemp; while, in others, it is the practice to separate and pull them at different times, according to their ripeness. The latter is obviously the better practice; as by pulling a large proportion of the crop before it is in a proper state of maturity, the quantity of produce must not only be considerably lessened, but its quality greatly injured by being rendered less durable.

After being thus pulled, it is tied up in small parcels, or what are sometimes provincially termed baits.

Where crops of this kind are intended for seeding, they should be suffered to stand till the seed becomes in a perfect state of maturity, which is easily known by the appearance of it on inspection. The stems are then pulled and bound up, as in the other case, the bundles being set up in the same manner as grain, until the seed becomes so dry and firm as to shed freely. It is then either immediately thrashed out upon large cloths for the purpose, in the field, or taken home to have the operation afterwards performed.

Process of grassing hemp.

The hemp, as soon, as pulled, is tied up in small bundles, frequently at both ends.

It is then conveyed to pits, or ponds of stagnunt water, about six or eight feet in depth, such as have a clayey soil being in general preferred, and deposited in beds, according to their size and depth; the small bundles being laid both in a straight direction and crosswise of each other, so as to bind perfectly together; the whole being loaded with timber, or other materials, so as to keep the beds of hemp just below the surface of the water.

It is not usual to water more than 4 or 5 times in the same pit, till it has been filled with water. Where the ponds are not sufficiently large to contain the whole of the produce at once, it is the practice to pull the hemp only as it can be admitted into them, it being thought disadvantageous to leave the hemp upon the ground, after being pulled. It is left in these pits four, five, or six days, or even more, according to the warmth of the season, and the judgment of the operator, on his examining whether the hempy material readily separates from the reed or stem; and then taken up and conveyed to a pasture field, which is clean and even, the bundles being loosened, and spread out thinly, stem by stem, turning it every second or third day, especially in damp weather, to prevent its being injured by worms, or other insects. It should remain in this situation, for two, three, four, or more weeks, according to circumstances, and be then collected together when in a perfectly dry state, tied up into large bundles, and placed in some secure building, until an opportunity is afforded for breaking it, in order to separate the hemp. By this means the process of grassing is not only shortened, but the more expensive ones of breaking, scutching, and bleaching the yard, rendered less violent and troublesome.

After the hemp has been removed from the field, it is in a state to be broken and swingled, operations that are mostly performed by common labourers, by means of machinery for the purpose, the produce being tied up in stones. The refuse collected in the latter processes, is denominated sheaves, and is in some districts employed for the purposes of fuel. After having undergone these different operations, it is ready for the purposes of the manufacturer.

To cultivate flax.

The soils most suitable for flax, besides the alluvial kind, are deep friable loams, and such as contain a large proportion of vegetable matter in their composition. Strong clays do not answer well, nor soils of a gravelly or dry sandy nature. But whatever be the kind of soil, it ought neither to be in too poor nor too rich a condition; because, in the latter case, the flax is apt to grow too luxuriant, and to produce a coarse sort; and, in the former case, the plant, from growing weakly, affords only a small produce.

To prepare the ground.

When grass land is intended for flax, it ought to be broke up as early in the season as possible, so that the soil may be duly mellowed by the winter frosts, and in good order for being reduced by the harrows, when the seed process is attempted. If flax is to succeed a corn crop, the like care is required to procure the aid of frost, without which the surface cannot be rendered fine enough for receiving the seed. Less frost, however, will do in the last, than in the first case; therefore the grass land ought always to be earliest ploughed. At seed time, harrow the land well before the seed is distributed, then cover the seed to a sufficient depth, by giving a close double time of the harrows. Water-furrow the land, and remove any stones and roots that may remain on the surface, which finishes the seed process.

Quantity of seed.

When a crop of seed is intended to be taken, thin sowing is preferable, in order that the plants may have room to fork or spread out their leaves, and to obtain air for the blossoming and filling seasons. But it is a mistake to sow thin, when flax is intended to be taken; for the crop then becomes coarse, and often unproductive. From eight to ten pecks per acre is a proper quantity in the last case; but when seed is the object, six pecks will do very well.

To save the flax and seed.

Flax should be pulled when the lower part of the plant begins to turn yellow, and when, on opening the pods, the most forward of the seeds are found in a soft state, and the middle of the seeds is green; while the seed is quite soft, the flax should be spread on the ground, in bundles about as much as a woman can grasp with both hands, and it should remain so, till the upper part is dry: in fine weather it will be dry in 24 or 48 hours; the bundles should be then made up, with the dry part inside, and then set up in stocks, of ten bundles each, and stand on the ground till the whole is dry, pods and all; the seed will then be ripe, and the flax in the best state; it may then be stacked, housed, or worked; great care should be taken to keep the root-ends even.

Method of watering.

When flax is pulled, it ought to be immediately put into the water, so that it may part with the rind or shaw, and be fit for the manufacturer. Standing pools, for many reasons, are most proper for the purpose, occasioning the flax to have a better colour, to be sooner ready for the grass, and even to be of superior quality in every respect. When put into the water, it is tied up in beets, or small sheaves; the smaller the better, because it is then most equally watered. These sheaves ought to be built in the pool, in a reclining upright posture, so that the weight placed above may keep the whole firm down. In warm weather, ten days of the watering process is sufficient; but it is proper to examine the pools regularly after the seventh day, lest the flax should putrify or rot, which sometimes happens in very warm weather. Twelve days will answer in any weather; though it may be marked, that it is better to give rather too little of the water, than too much, as any deficiency may be easily made up, by suffering it to lie longer on the grass, whereas an excess of water admits of no remedy. After lying on the grass for a due time, till any defect of the watering process is rectified, the flax is taken up, tied when dry in large sheaves, and carried to the mill to be switched and prepared for the hackle.

Mr. Lee's invention for dressing flax. Instructions for using the machinery.

The proceess is divided into two parts; the first part is intended for the farmer, or flax-grower, to bring the flax into a fit state for general or common purposes. This is performed by three machines; one for thrashing out the seed, one for breaking and separating the wood from the fibre, and one for further separating the broken wood and matter from the fibre. In some cases, the farmers will, perhaps, thrash out the seed in their own mill, and, therefore, in such cases, the first machine will be, of course, unnecessary.

The second part of the process is intended for the manufacturer to bring the flax into a state for the very finest purposes, such as lace, cambric, damask, and very fine linen. This second part is performed by the refining machine only.

The thrashing machine.

Take the flax in small bundles, as it comes from the field or stack, and holding it in the left hand, put the seed end between the thrashing machine, and the bed or block, against which the machine is to strike; then take the handle of the machine in the right hand, and move the machine backward and forward, to strike on the flax, until the seed is all thrashed out.

The breaking machine.

Take the flax in small handsful in the left hand, spread it flat between the third and little finger, with the seed end downwards, and the root end above, as near the hand as possible; then put it between the beater of the breaking machine, and beat it gently till the three or four inches, which have been under the operation of the machine, appear to be soft; then remove the flax a little higher in the hand, so as to let the soft part of the flax rest upon the little finger, and continue to beat it till all is soft, and the wood is separated from the fibre, keeping the left hand close to the block, and the flax as flat upon the block as possible. The other end of the flax is then to be turned; and the end which has been beaten is to be wrapped round the little finger, the root-end flat, and beaten in the machine till the wood is separated, exactly in the same way as the other end was beaten.

The cleansing machine,

Is to be used in the same way, in all respects, as the breaking machine; first cleansing one end of the flax, and then turning the other, keeping the flax all the while flat in the hand.

The hackle.

A common hackle will be found useful, in this stage, for opening the ends; and may be placed, for greater convenience, at the side of the breaking and cleansing machine.

This concludes the first process of the machinery intended for the farmer, or flax-grower. The second, or manufacturer's process requires

The refining machine.

Take a small piece of flax, as it comes from the breaking or cleansing machine; pass the seed end through the fluted rollers of the refining machine, and bring it round, laying it flat on the root-end of the flax, forming it into a skein. A few fibres of the end brought round, and looped in the flax on which it is laid, will keep the skein together. It must be kept flat and even on the machine, which may continue to go round, and work the flax, till it is brought to any degree of fineness that may be required, and this will not require more than from two to six minutes.

Washing or whitening.

The flax, when prepared by these machines, without having been water-steeped, or dew rotted, may be washed in small quantities at a time, either in water only, or with soap and water, without any other mixture, and brought by these simple means to the purest white. It is to be wrung several times in water till the water becomes no longer coloured from the matter; and care is to be taken that the flax is laid flat like tape, and then spread upon the grass; but it is recommended that the flax should be spun in the yellow state, and then washed in warm water and soap, or boiled, with care, in water and soap, from 10 to 15 minutes, which, when dried, will be perfectly white. If the weather should be favourable, it would be well to have it dried on the grass.

As to the labour required, the machines are easily wrought by women or girls, and without any assistance from men.

The produce.

As to the produce, of different degrees of fineness, from a given weight of the raw material, we subjoin the following statement.

112 lbs. of flax from the stack, after the seed was thrashed out, produced 30 lbs. in the state No. 1; refined to No. 3, it produced 20 lbs. of flax and 3 lbs. of common tow; 20 lbs. of No. 3 produced 14 1-2 lbs. of No. 4. The loss in weight is caused by the discharge of matter; there is no loss of fibre.

An average crop will produce about two tons to the acre, after the seed is thrashed out. This will produce one fourth fibre, making 10 cwt. to the acre, No. 1.—*Farmer's Mag.* 1815.

To cultivate hops.—The soil, &c.

The hop is planted on various soils, and chiefly in valleys. Hops are generally of the best quality from strong clay land. The crop, however, is there very precarious. Those on peat are much more productive, but are liable to be affected by the mould in some seasons, which reduces their value considerably. The best plantations are on a deep loamy soil, where the produce of the latter, and the quality of the former, are sometimes obtained. Those which are grown on sandy and gravelly lands are seldom remarkable for either great produce, or superior quality.

The plant is extremely liable to disasters, from its first putting up in the spring, until the time of picking the crop, which is in September. Snails or slugs, ants and flies, are formidable enemies in the first instance. Frosts are inimical to its growth, and the vines are frequently blighted, even after they have reached the top of the poles. Small green flies, and other insects, which make their appearance in the months of May and June, when the wind is about north-east, often greatly injure them; and they are subject to take damage by high-winds from the south-west. The best situation for a plantation, therefore, is a southern aspect, well shaded on three sides, either by hills or planting, which is supposed to be the chief protection that can be given them.

To plant hops.

In the winter time provide the soil and manure for the hop-ground against the following spring. If the dung be rotten, mix it with two or three parts of common earth, and let it incorporate together, till there is occasion to make use of it in making the hop-hills; but if it be new dung, then let it be mixed as before till the spring in the next year, for new dung is very injurious to hops. Hops require to be planted in a situation so open that the air may freely pass round and between them, to dry up and dissipate the moisture, which often destroys the middles of large plantations, while the outsides remain unhurt.

The hills should be 8 or 9 feet asunder. If the ground be intended to be ploughed with horses between the hills, it will be best to plant them in squares, chequerwise: but if the ground is so small that it may be done with the breastplough, or spade, the holes should be ranged in a quincunx form. Which way soever is made use of, a stake should be stuck down at all the places where the hills are to be made.

To choose hops.

Be very particular in the choice of the plants as to kind; for if the hop-garden be planted with a mixture of several sorts of hops, that ripen at several times, it will cause much trouble, and great detriment.

The two best sorts are the white, and the grey bind; the latter is a large square hop, more hardy, bears more abundantly, but ripens later than the former. There is another sort of the white bind, which ripens a week or ten days before the common; but this is tenderer, and a less plentiful bearer; though it has this advantage, that it comes first to market. If there be a sort of hop you value, and would wish to increase, the superfluous binds may be laid down when the hops are tied, cutting off the tops, and burying them in the hill; or when the hops are dressed all the cuttings may be saved; for almost every part will grow, and become a good set the next spring.

Seasons of planting.

The Kentish planters approve the months of October and March. The most usual time of procuring the cuttings is in March, when the hops are cut and dressed. As to the manner of planting the sets, there should be five good sets planted in every hill, one in the middle, and the rest round about, sloping. Let them be pressed close with the hand, and covered with fine earth; a stick should be placed on each side of the hill to secure it.

To form a new plantation.

The best method is, to have cuttings from approved stock, planted out the year before they are wanted, in the hop ground; as the use of plants instead of cuttings, not only gains a year, but are more certain to flourish.

A small piece of moist land is sufficient to raise plants for many acres, and at little expense. If the ground be in grass, pare and dig in the pods; work the land with a spade, and set it out into ridges of 3 1-2 yards wide, and two yards between each; having a strip of grass, (called a pillar,) next every ridge, and an open drain between every two pillars, the depth of which must vary according to the soil, some being less than one foot, and others nearly four foot in depth. Three rows of plants, or, as they are termed, hills, are made upon each ridge, which should intersect each other; they are generally 2 yards distant in the rows, so that about 1300 are the usual number of hills in a statute acre. Small sticks are proper to tie the bines up to, the first year, then small poles for a year or two; the size of which should be gradually increased. Some set 2 poles to every hill, which is proper for ground producing luxuriant bines; but on clay land three poles are set in a triangular form to the hills on the two outside rows of each ridge, and only two in the middle row. Many additional poles, longer than the rest, called catch-poles, are also set to take the bines as they run beyond the lesser poles. Where the bine is weak, three heads are commonly trained up each pole; though two are better, if strong. If the ground intended for a new plantation is not clean from couch-grass, a complete fallow is essential, whether it is grass or stubble; and a crop of turnips may be taken to advantage, if the land is proper for their growth, and can be made clean, as hops are planted in March.

To take up hop ground.

The following are termed the annual orders:—Digging the ground completely over; hoeing the earth from the hills, and cutting off the stock a little above the root, which are called pickling and cutting; poling, which is carrying the poles from the stacks, and setting them down to the hills with a round implement, shod with iron, and called a poy, having a crutch at the top, and a peg through the middle to tread upon; tying the bines round the poles with rushes, and pulling up the superfluous bines; hoeing the ground all over with a hoe of large dimensions; wheeling and laying manure upon every hill; covering the manure with the soil, which is done by scraping the ground over with a hoe, and is called hilling; and stacking, which is carrying and setting up the poles into heaps or stacks, after the crop has been taken.

Extra-works.

As the preceding are termed the ordinary, so the following are called the extra-works, as not being included in the yearly bargain with the men by the generality of planters, and some of them are done only by the very best managers. On clayey ground, either the earth ought to be bared off the hills, and a covering of good manure applied to them previous to digging, which will require from 12 to 15 tons per acre; or from 20 to 25 tons of manure, or a greater quantity of fresh earth (when the ground wants condition) should be wheeled and spread all over the ridges. It is not improper, in some cases, to pursue these methods alternately; but on boggy and very rich ground, the earth only can be applied with advantage. The drains should be scoured out yearly on very wet ground; and what is thrown out is always intermixed with the soil in digging; on drier soils this is done every second or third year, and on very dry land, it is scarcely necessary to do it at all.

Recruiting the stock by planting, where any hills have failed, is done at little cost in well-managed plantations, as there are seldom many at once in those. If there is any couch-grass, it should be digged out with three-pronged forks in March, and carried off the ground. The renewal of poles requires from one to two hundred per acre every year. If when the bines first appear, they are eaten by slugs, a handful of malt culm, or saw dust, is sometimes laid round each hill, which they cannot travel over; and should flies or ants attack them, soot is the best preventive. The carrying in and setting catch poles varies much as to number, as some set fewer than one hundred, and others five or six hundred per acre. Moving the drains and pillars is generally done once, but twice moving is better, (whether the grass be made into fodder, or is suffered to fall into the drains for manure,) as then no seeds scatter on the ground. Extra-hoe, once before the hilling, and once after. After high winds, many poles are broken down which should be set up again soon.

Manure proper for hop-culture.

As to the manure most proper for the hop-culture, good stable dung is much used, and is preferred to the manure made by beasts, as the latter encourages ants on strong ground. Woollen rags are the best for forcing a luxuriant bine, and if used with judgment, are excellent for clayey grounds; but they are apt to make the hops small, if too many are used. Malt culm, and dove manure are excellent, and one complete dressing with lime is very serviceable for strong ground.

To pick hops.

When the crop is ripe, a proper number of pickers are procured, for whom are provided light wooden frames, called binges: they are clothed with hop-baggings, into which the hops are picked off the poles by women and children, having them brought by men, who take them up by cutting the binds about a foot above the ground, and drawing up the poles by an instrument called a dragon. Each binge has from 4 to 6 pickers, and a man attends to one or two binges, according to the crop; he strips the bines from the poles as they are picked, and lays them in heaps ready for stockings; he also carries the hops to the kilns, if near; or to a cart, as they are measured from the binge. The number of binges employed vary with the crop and kiln-room; about one to an acre is usual. The hops are taken out of the binges with a basket which holds 6 Winchester pecks.

Another method.

The most convenient way of picking them is into a long square frame of wood, with a cloth hanging on tenter hooks within it, to receive the hops as they are picked.

They must be picked very clean, free from leaves and stalks; and as there shall be occasion, 2 or 3 times in a day, the frame must be emptied into a hop bag made of coarse linen cloth, and carried immediately to the oast or kiln, in order to be dried; for if they should be too long in the bag, they will be apt to heat and be discoloured. If the weather be hot, there should no more poles be drawn than can be picked in an hour, and they should be gathered in fair weather, if it can be, and when the hops are dry; this will save some expense in firing, and preserve their colour better when they are dried.

To dry hops.

The best method of drying hops is with charcoal on an oast or kiln, covered with hair-cloth of the same form and fashion that is used for drying malt. The kiln ought to be square, and may be of 10, 12, 14, or 16 feet over at the top, where the hops are laid, as the plantation requires, and the room will allow. There ought to be a due proportion between the height and breadth of the kiln, and the beguels of the steddle where the fire is kept; viz. if the kiln be 12 feet square on the top, it ought to be 9 feet high from the fire, and the steddle ought to be 6 feet and a half square, and so proportionable in other dimensions.

The hops must be spread even upon the oast, a foot thick or more, if the depth of the curb will allow it: but care is to be taken not to overload the oast if the hops are green or wet. The oast ought to be first warmed with a fire before the hops are laid on, and then an even steady fire must be kept under them; it must not be too fierce at first, lest it scorch them, nor must it be suffered to sink or slacken, but rather be increased till the hops are nearly dried, lest the moisture or sweat which the fire has raised, fall back or discolour them.

When they have lain about nine hours they must be turned, and in 2 or 3 hours more they may be taken off. It may be known when they are well dried, by the brittleness of the stalks, and the easy falling off of the hop-leaves.

To bag hops.

As soon as the hops are taken off the kiln, lay them in a room for three weeks or a month to cool, give, and toughen; for if they are bagged immediately they will powder, but if they lie awhile, (and the longer they lie the better, provided they are covered close with blankets to secure them from the air,) they may be bagged with more safety, as not being liable to be broken to powder in treading; and this will make them bear treading the better, and the harder they are trodden the better they will keep.

To dress hops.

When the ground is dug in January or February, the earth about the hills, and very near them, ought to be taken away with the spade. About the end of February, if the hops were planted the spring before, or if the ground be weak, they ought to be dressed in dry weather; but if the ground be strong and in perfection, the middle of March will be a good time; and if it is apt to produce over rank-binds, the beginning of April may be soon enough. Then having with an iron picker, cleared away all the earth out of the hill, so as to clear the stock to the principal roots, with a sharp knife cut off all the shoots which grew with the binds the last year; and also all the young suckers, that none may be left to run in the alley, and weaken the hill. It will be proper to cut one part of the stock lower than the other, and also to cut that part low that was left highest the preceding year. In dressing those hops that have been planted the year before, cut off both the dead tops aud the young suckers which have sprung up from the sets, and also cover the stocks with fine earth, a finger's length in thickness.

To pole hops.

About the middle of April the hops are to be poled; when the shoots begin to sprout up, the poles must be set to the hills deep in the ground, with a square iron picker or crow, that they may the better endure the wind: three poles are sufficient for one hill. These should be placed as near the hill as possible, with their bending tops turned outwards from the hill, to prevent the binds from entangling; and a space between two poles ought to be left open to the south, to admit the sunbeams.

To tie hops.

The buds that do not clasp of themselves to the nearest pole when they are grown to three or four feet high, must be guided to it by the hand, turning them to the sun, whose course they will always follow. They must be bound with withered rushes, but not so close as to hinder them from climbing up the pole. This continue to do till all the poles are furnished with binds, of which two or three are enough for a pole; and all the sprouts and binds that there are no occasion for, are to be plucked up; but if the ground is young, then none of these useless binds should be plucked up, but should be wrapped up together in the middle of the hill.

To gather hops.

About the beginning of July, hops begin to blow, and will be ready for gathering about Bartholomew-tide. A judgment may be made of their ripeness by their strong scent, their hardness, and the brownish colour of their seed. When by these tokens they appear to be ripe they must be picked with all the expedition possible; for if at this time a storm of wind should come, it would do them great damage, by breaking the branches, and bruising and discolouring the hops; and it is very well known that hops, being picked green and bright, will sell for a third more than those which are discoloured.

To cultivate the madder plant.

The ground is ploughed deep in autumn, and again in March; and then laid up in ridges, eighteen inches asunder, and about a foot high. About the beginning of April the ground is opened where the old roots are planted, and the side shoots taken off, which are transplanted immediately into the new ridges, at about a foot distance, where they remain two seasons; at Michaelmas, when the tops of the plants are decayed, the roots are taken up. This method of planting in ridges, is only necessary in wet land. If all the horizontal roots are destroyed from time to time, it will cause the large, downright roots, to be much bigger, in which the goodness of this plant chiefly consists. After the madder roots, the only parts of the plant used by dyers, are taken up, they are kiln-dried, and then reduced to powder by a mill. Previously to the grinding they are carefully assorted.

The fine quality of madder is distinguished by its being of a bright, lively, light colour, well ground, without any coarse parts proceeding from the peelings. Fresh is always more valuable than old madder. It should be kept close to prevent the access of air, as its virtue evaporates when exposed.

Madder is principally cultivated in Holland, Germany, and France, especially the former place, where it grows in greater abundance than in any other part of the world. The Turkey madder-root, is principally cultivated about Smyrna. This plant may be propagated either by offsets or seeds. On a light thin soil the culture cannot be carried on to any profit; that soil in which the plant delights is a rich sandy loam, three feet or more in depth.

The ground being first made smooth, is divided into beds four feet wide, with alternate alleys, half as broad again as the beds. In each alley is a shallow channel for irrigating the whole field, &c. that that part of the alley that is not otherwise engaged may be sown with legumes. The madder-seed is sown broad-cast in proportion of from 25 to 30 lbs. per acre about the end of April. In a fortnight or three weeks the young plants begin to appear, and from this time to the month of September, care must be taken to keep the ground well watered and free from weeds. If the plants are examined in autumn, they will be found to be surrounded with small yellow offsets at the depth of two inches, and early in September, the earth from the alleys is to be dug out and laid over the plants of madder to the height of two or three feet; with this the first year's operation finishes.

The second year's work begins in May, with giving the beds a thorough weeding; and care must be taken to supply them with plenty of water during summer. In September, the first crop of seed will be ripe, at which time, the stems of the plants may be mown down, and the roots covered a few inches with earth, taken as before out of the alleys.

The weeding should take place as early as possible in the spring of the third year; and the crop, instead of being left for seeds, may be cut three times during summer for green fodder, all kinds of cattle being remarkably fond of it. In October, the roots are taken up, the offsets are carefully separated, and immediately used to form a new plantation; and the roots after being dried, are sold either without further preparation, or ground to a coarse powder, and sprinkled with an alkaline ley. The roots lose four-fifths of their weight in drying, and the produce of an acre is about 2000 lbs. weight of dry saleable madder.

Use of madder.

The principal use of madder is in dyeing. It gives out its colour both to water and rectified spirit; the watery tincture is of a dark, dull red: the spirituous of a deep bright one. It imparts to woollen cloth, prepared with alum and tartar, a very durable, though not a very beautiful red dye. As it is the cheapest of all red drugs, that give a durable colour, it is the principal one commonly made use of for ordinary stuffs. Sometimes its dye is heightened by the addition of Brazil-wood, and sometimes it is employed in conjunction with the dearer reds, as cochineal, for demi-scarlets, and demi-crimsons. Madder-root is sometimes employed in medicine as an emmenagogue. When the madder is given to animals with their food it produces a curious phenomenon, namely tinging their bones with red. The bones of young pigeons will be thus tinged of a rose-colour in twenty-four hours, and of a deep scarlet in three days; but the bones of adult animals will be a fornight in acquiring a rose-colour.

Best method of hay-making.

Instead of allowing the hay to lie, as usual in most places, for some days in the swathe after it is cut, never cut hay but when the grass is quite dry; and then make the gatherers follow close upon the cutters; put it up immediately into small cocks about three feet high each, and of as small a diameter as they can be made to stand with; always giving each of them a slight kind of thatching, by drawing a few handsful of the hay from the bottom of the cock all round, and laying it lightly upon the top, with one of the ends hanging downwards. This is done with the utmost ease and expedition; and when once in that state, the hay is, in a great measure, out of danger; for unless a violent wind should arise immediately after the cocks are put up, nothing else can hurt the hay; as no rain, however violent, can penetrate into these cocks but for a very little way; and if they are dry put up, they never sit together so closely as to heat; although they acquire, in a day or two, such a degree of firmness, as to be in no danger of being overturned by wind after that time, unless it blows a hurricane.

In these cocks allow the hay to remain until, upon inspection, the farmer judges it will keep in pretty large tramp cocks (which is usually in a week or two) according as the weather is more or less favourable, when two men each with a long pronged pitchfork, lift up one of these small cocks between them with the greatest ease, and carry them one after another to the place where the tramp-cock is to be built: and in this manner proceed over the field, till the whole is finished.

Mode of hay-making in Yorkshire.

Rippling clover or seeds, has been practised about forty years, in the neighbourhood of Borough-bridge. It is found to answer much better than the method of making into cocks.

The clover is cut, and after it has lain four or five days in the swathe, till it is sufficiently dry, the hay-maker with a rake, rolls up a sufficient quantity to form a ripple, which is set up in the form of a cone. Taking a few of the longest straws, he twists them round the top, which forms the point of the cone, keeps the ripple compact, and shoots off the rain. In taking up the clover from the swathe, and forming the ripple, it is necessary to keep the upper or dry part inwards, by that means it is much sooner dry, and in a fit state for the stack. It is generally necessary for clover to remain 5 or 6 days in the ripple before it is put into the stack; but that depends on the state of the weather. There is no occasion to untie the ripples. The method of rippling is not so expensive as cocking; it is much superior both in wet and dry seasons—not so liable to be injured by the wet—much sooner dry, and, of course, of a better quality, and more nourishing for cattle. Each ripple will weigh, when dry, about 4 or 5 lbs.; they should not be made too large. Except where meadow grass is very long it would not be practicable to ripple it and is very rarely done in Yorkshire. The practice of rippling is simple; attended with little trouble or expense; and whenever tried, will recommend itself.

To manage cut grass for hay.

Grass, when cut for hay, ought to be quickly raked, in order that its powers may neither be exhausted by the sun, nor dissipated by the air. In the first stage, small cocks are preferable, and on after days, these may be gathered into larger ones, or hand-ricks, by which method, the hay is equally made, and properly sweetened. After standing 8 or 10 days in these ricks, according to the nature of the weather, hay may be carted home, and built in stacks of sufficient size for standing through the winter months.

Importance of straw in husbandry.

This is a subject that has not hitherto been so much attended to as its importance deserves. Though many useful observations on straw, are occasionally introduced in agricultural writings, and though its value, as the basis of future crops, is fully admitted by every intelligent farmer, yet the subject has seldom been professedly treated of at any length: we shall endeavour, therefore, to compress the most important particulars connected with it, under the following heads:—

1. The weight of straw produced on an average of the different crops of grain and pulse per statute acre.

2. The value of the different kinds of straw, and

3. The various uses to which each kind of staw is applicable.

Weight of straw produced by the different crops.

The quantity of straw per acre, differs according to a variety of circumstances; as, 1. The species of grain, whether wheat, barley, oats, &c.; 2. The different kinds of the same grain; 3. The season, (for in dry seasons the quantity is less than in moist;) 4. The soil, for in fertile soils the straw is more abundant than in poor ones; 5. The season when the seed is sown, for spring-sown wheat has less straw than the winter sown; and, 6. The manner in which the straw is cut, for an inch or two at the root-end of the straw makes a great addition to the dunghill.

From a statement by Mr. Young, it would appear, that the average produce, in straw, of all the different crops stubbles included, may be calculated at 1 ton 7 cwt. per English acre; but that is rejecting the weaker soils.

It is calculated by Mr. Brown, of Markle, that on an average of years, the produce of straw in good land, and under tolerable management, will be nearly in the following proportion, per English acre:

	Stones.
Wheat	160
Beans and Peas,	130
Oats,	130
Barley,	100
Total	520

Or, at an average of these crops, 130 stone per acre, 22 lbs. avoirdupois, per stone; in all 2860 lbs. or 1 ton 5 cwt. 2 quarters and 4 lbs.

It may be safely estimated, that on an average of years, well cultivated and fertile soils, when the crop is carefully cut down, will annually produce, on the average of the crops above mentioned, and taking the average of the kingdom, 1 ton 5 cwt. per English acre.

Value of the different kinds of straw.

The intrinsic value of straw must vary materially, according to its leading properties, the quantity of manure into which it may be converted by littering, or its fitness to be employed as thatch, these being the chief uses to which it is applicable; but, in general, its price depends on its vicinity to large towns. It is only in situations where foreign manure can be procured easily, and at a cheaper rate than by converting the straw raised upon the farm into dung, that the sale of straw is ever permitted. Straw is generally dearer in London and its neighbourhood, than in any other part of the kingdom. It is sold there by the load, which consists of 36 trusses, of 36 lbs. each, or 1296 lbs. in all. Two loads of wheat-straw per acre are reckoned a tolerable crop.

As straw is rarely permitted to be sold, being usually employed in maintaining winter stock, the real value of the article, to the farmer, is but inconsiderable, depending upon the quantity and quality of the dung it produces. So little is it thought necessary accurately to ascertain the value of straw, that in several cases it has been given by the outgoing to the incoming tenant, as an equivalent for the expense of harvesting, thrashing, and marketing the last crop. It is often thought insufficient to cover even that expense, and a farther abatement is allowed on the price of the grain.

Various purposes to which straw is applicable.

The subject of feeding with straw will be better understood by considering the specific properties of the different kinds of straw employed in feeding stock, and the rules that ought to be observed when stock are fed with that material.

Wheat straw.

This kind of straw, from its strength, is considered to be peculiarly calculated both for litter and thrashing; and indeed, wherever, the practice of cutting straw into chaff, for mixing with corn for horses, prevails, wheat-straw is preferred. When given to cattle or horses, it is sometimes cut into chaff, and either given raw in that state, or, what is greatly preferred, steamed with other food, in particular with potatoes.

In order to improve wheat-straw as fodder, it is the practice, in some parts of England, to cut the grain rather greener than in Scotland, which preserves more of the natural juices, and consequently makes the fodder better. Some of the best farmers were accustomed to cut wheat much earlier than common in their respective districts. One of these was a miller in Norfolk, who occupied a large farm, where he always cut his wheat several days before any one else thought of beginning, well knowing the good consequences in the value of the grain. It must also be less apt to be injured by shaking or harvesting.

Oat straw.

Among the culmiferous grains, the straw of the oat is considered to be the best fodder, when given uncut. It is well known, indeed, that oat-straw, during the winter season, is almost universally given instead of hay, in all the best cultivated counties of Scotland, during the winter months, though that of peas and beans is certainly preferred where both are grown.

In some districts farmers cut oats in the straw into a species of fodder, which is called "cut meat." This is given not only to horses, but to cattle, especially fattening cattle. It is thought to give not only fatness but a fineness of skin to all sorts of stock.

Bean straw.

If well harvested, this straw forms a very hearty and nutritious kind of food for cattle in the winter season. Both oxen and horses, when duly supplied with oats, in proportion to the work they have to execute, thrive well on it; and the reduced parts, or what is termed in England the coving-chaff, is found valuable, as a manger food, for the labouring teams; when blended with other substances, it is probable that, in particular cases, the stems might be cut into chaff with advantage: but when made use of in these methods, it should be used as fresh as possible after being thrashed. A mixture of bean-straw, (which by itself is rather dry,) and of peas-haum, which is sweet and nourishing, makes excellent fodder.

But though this straw, more especially when mixed with peas-haum, is of great value as fodder to the working stock of the farm, it does not suit well with riding-horses, as it is apt to hurt their wind. In some horses, both bean-straw and peas-haum are apt to occasion colic pains, or the disease which is provincially called botts, probably occasioned by flatulency. For this disease, about half an ounce, or a table-spoonful of laudanum, is found to be a good remedy.

Peas straw.

In Scotland, the haum of peas is used as fodder for working-horses, instead of hay; and when well harvested, forms a very excellent provender, insomuch that it is considered to be of almost equal value as the grain itself.

Tare-straw or hay.

This is an article strongly recommended by some farmer; for when the land has been dunged, and the seed good, the produce is considerable. The crop should be cut as soon as the blossoms begin to fall off, or the pods to form, and the whole converted into hay-tares require a great deal of sun to cure, and rain is very injurious to them. It would be a good plan to mix them with dry straw, which would improve both.

Rules regarding the consumption of straw in feeding cattle.

Straw is much used in the feeding of cattle in Scotland; and there can be no doubt, that oxen will feed well on straw and turnips, if the straw be good. It is recommended, in all cases, that for a month or six weeks after a bullock is put to turnips, straw only should be given with them: But in the more advanced stages of fattening, hay is so much superior, that it should if possible be supplied. It is certain, at the same time, that hay is a very expensive food for stock, and ought to be saved as much as possible where it can prudently be done. It is well known that a full allowance of turnips and straw, during the winter months, will fatten better, than a small allowance of hay in place of the straw. In the spring hay, which retains its nutritive juices longer than straw, is much more valuable, both for fattening stock and feeding horses; and it is therefore the practice to reserve hay for about three months consumption of these kinds of stock, and for no others.

Rules for feeding horses with straw.

In regard to horses, they seldom get any hay for three months in winter; but with straw and the corn, which must always be given them, whether they get straw or hay, they not only plough three-fourths of an English acre per day, or work from seven to eight hours at other labour, but are actually full of flesh and vigour when sowing commences. They must, however, have hay instead of straw, when the severe labour of Spring takes place.

When, therefore, farmers' horses are so much reduced in condition as to be unable to go through the severe labour of Spring, it is owing to their not having got a sufficient quantity of corn. Peas and bean-straw certainly make the best fodder, when not injured by rain; but if that kind of straw is damaged in harvest, white straw is to be preferred.

Rules for feeding sheep with straw.

There is no food of which sheep are fonder than peas-straw. The soil of the pastoral districts in Scotland, being rarely of a kind calculated for peas, any extensive cultivation of that grain is impracticable; but where circumstances are favourable to that crop, peas ought to be cultivated, were it merely for the straw, as it would enable the store-farmers to carry on their system of sheep-farming with much more advantage. Indeed, the same plan might be advisable in other districts. It might be proper to add, that for ewes at yeaning time, lentil-hay is better than tare-hay or even peas-haum.

Miscellaneous rules and observations regarding the consumption of straw.

On turnip farms in Scotland, it is the usual practice to feed horses till March, where the labour is not severe, and cows through the winter, with oat-straw, whilst the fattening and straw-yard cattle get the straw of wheat and barley. If any peas or beans be cultivated on the farm, that straw being given to the horses, a part of the oat-straw may be left for the fattening and straw-yard cattle. Upon turnip farms, it is not thought profitable to cut the greater part of the clovers for hay. These are usually eaten by sheep, and no more hay saved, than what may serve the horses, cows, and fattening stock, for eight or ten weeks, immediately before grass, with a small quantity occasionally given to the sheep fed on turnips.

The expense of feeding even the horses alone, for eight months, on hay, would be more than a farmer can well afford; at the same time it is a rule with the best farmers, to give hay to their horses in the early part of winter; then peas or bean-straw, till seed-time commences in the spring; and afterwards hay.

Straw keeps much better unthrashed, in a large stack, than in a barn. Straw in general, more especially white straw, is found to lose its value as fodder, in whatever way it may be kept, after the sharp dry breezes of the spring months have set in.

It is a general rule, that straw, when intended to be used as food for stock, should be given, as speedily as possible, after it is thrashed. The thrashing separates and exposes it so much, that if kept long, it is, comparatively speaking, of little value as fodder. Lisle, an intelligent writer on agriculture, and a practical farmer, states, that he found cows did not eat straw so well on a Monday morning, as they did the rest of the week, because the straw was not fresh from the flail. Straw, therefore, should be constantly made use of, as soon after it is thrashed as possible; for by keeping, it becomes either musty, or too dry, and cattle do not eat, nor thrive on it so well. It cannot be doubted that air has a very injurious effect upon all kinds of fodder, and the more it can be kept from the influence of the sun and the atmosphere, so much the better. It is seldom given as fodder, unless to straw-yard cattle, after the month of March.

When clover is sown with grain crops, the clover has often arrived at such a length, as to mix with the straw in cutting the crop. This certainly improves the straw in good harvests; but as little clover as possible should be cut-with the straw, as it makes it very difficult to secure the crop, unless it be left upon the ground for several days.

Straw as applicable to litter.

Straw, when mixed with the dung and the urine of cattle, horses, &c. &c. is a rich and excellent manure; but even alone, when ploughed in, or decomposed by pure simple water, it is of use. All the various sorts of straw answer the purposes of litter. Some farmers contend that rye straw is the best litter; others prefer the straw of wheat, which absorbs, it is said, so much urine and moisture, that a cart of wheat straw is supposed equal in value to three carts of well made dung. In England, the straw of peas and beans is extremely valuable, forming, it is said, when well broken by thrashing, a desirable litter for working horses, hogs, and other stock; but in Scotland, it is never used as litter, unless it has been spoilt by bad management, or a most unseasonable season in harvest, as its feeding properties are there so well known. Littering is of use, not only for converting straw into manure, but for keeping the animals warm and dry. In fact, cattle cannot be soiled on clover, or fed on turnips, without abundance of litter.

There are four modes of converting straw into dung, by littering stock:—1. In stalls or stables; 2. In hammels: 3. In fold-yards; and 4. In open folds, where sheep are littered with straw.

The quantity of dung produced from a given quantity of straw, depends a good deal upon the kind of straw that is used, (as some kinds absorb much more moisture than others), and upon the degree of care employed in preparing the dung. Speaking generally, the orinal weight of straw may be tripled, if the manufacturing process be properly conducted, and the dung applied to the ground before its powers are lessened or exhausted. The quantity of dung which may be made from an acre, especially if the dung arising from clover, turnips, and hay, consumed on a farm, is included in the general stock, will be something more than four tons; consequently, any farm of decent soil may be manured at the rate of 12 tons per acre, every third year, from its own produce, provided the corn crops are cut with accuracy, and the straw manufactured into dung, in a husbandman-like manner.

Straw as applicable to thatching.

For many ages straw was the common material for roofing farm-buildings and cottages, and was formerly made use of even in towns. The expense of a thatched roof is not great, in so far as respects labour; and the value of the straw is, to the grower, either the price he could obtain for it, or that of the dung that could be made from it, as the kind used for thatch is seldom used as fodder. Where economy must be attended to in the building of cottages, straw is taken as the least costly material; but in these days, when manure is so extremely valuable, as little straw as possible should be spared for other purposes.

The durability of a thatched roof is likewise maintained. A good coat of thatch will need very little repair during an ordinary lease. But care must be taken that the straw is very clean thrashed. If it is not, the grain left will soon spring, and introduce putrefaction, and encourage vermin. The thrashing mill renders straw less fit for thatch than when it is thrashed by the flail.

In Somersetshire, wheat is seldom thrashed with the straw, but the ears are cut off, and the straw, bound in sheaves, and tied very tight, is used for thatching.

Miscellaneous uses of straw.

It is well known that various articles are manufactured from straw, such as bonnets, and other ornaments for the ladies. Even in the remote county of Cathness, the straw manufacture is carried on. The straw is prepared in London, and the plait is returned to that market. Straw-plaiting is the principal manufacture in Bedfordshire. The quantity thus used is very considerable, and it furnishes employment for numbers of persons who might otherwise with difficulty find the means of subsistance.

In some districts straw mixed with clay is used for building the walls of houses or gardens, and with the same mixture for the roofs of houses, instead of the common mode of thatching.

In districts on the sea-shore, it is common for experienced farmers to keep in reserve a considerable proportion of their wheat or barley straw, and to make it into a dunghill, alternately with the sea-ware, stratum upon stratum, till both are exhausted. This is an excellent plan where the sea-weed cannot be immediately applied; but it is the best system to plough it in, when obtained.

Near Gloucester great quantities of beanhaum, as well as common straw, are bought up at a potash manufactory, and burnt for the ashes.

Straw is also used for stuffing beds. For that purpose, the chaff of oats is found to be a material not much inferior to ordinary feathers; and being so much cheaper, chaff-beds are almost universally used by the lower orders in Scotland.

Another purpose to which straw is applied, is that of packing; and it is proper to observe, that the quantity used in packing china and stone ware, in the districts where these manufactories prevail, as in Staffordshire, is found to be a serious injury to the farmer.

The most recent discovery, connected with any straw production, is that of the Rev. James Hall, who has ascertained, that every bean-stalk, according to its size, contains from 20 to 35 filaments, which are of a nature among the strongest, and most durable hitherto discovered. He calculates that on an average there are about 200 lbs. weight of such filaments on an acre, capable of being applied to various useful purposes, where durability and strength, rather than fineness and delicacy, are required.

To under-drain clay lands.

This operation is always best performed in spring or summer, when the ground is dry. Main drains ought to be made in every part of the field where a cross-cut or open drain was formerly wanted; they ought to be cut four feet deep, upon an average. This completely secures them from the possibility of being damaged by the treading of horses or cattle; and being so far below the small drains, clear the water finely out of them. In every situation, pipe-turfs for the main drain, if they can be had, are preferable. If good stiff clay, a single row of pipe-turf; if sandy, a double row. When pipe-turf cannot be got conveniently, a good wedge drain may answer well, when the sub-soil is a strong, stiff clay; but if the sub-soil be only moderately so, a thorn-drain, with couples below, will do still better; and if the sub-soil is very sandy, except pipes can be had, it is in vain to attempt under-draining the field by any other method. It may be necessary to mention here, that the size of the main drains ought to be regulated according to the length and declivity of the run, and the quantity of water to be carried off by them. It is always safe, however, to have the main drains large, and plenty of them; for economy here seldom turns out well.

Having finished the main drains, proceed next to make a small drain in every furrow of the field, if the ridges formerly have not been less than 15 feet wide. But if that should be the case, first level the ridges, and make the drains in the best direction, and at such a distance from each other as may be thought necessary. If the water rises well in the bottom of the drains, they ought to be cut 3 feet deep; and in this case would dry the field sufficiently well, although they were from 25 to 30 feet asunder; but if the water does not draw well to the bottom of the drains, 2 feet will be a sufficient deepness for the pipe drain, and 2 1-2 feet for the wedge drain. In no case ought they to be shallower where the field has been previously levelled. In this instance, however, as the surface water is carried off chiefly by the water sinking immediately into the top of the drains, it will be necessary to have the drains much nearer each other—say from 15 to 20 feet. If the ridges are more than 15 feet wide, however broad and irregular they may have been, follow invariably the line of the old furrows, as the best direction for the drains; and where they are high-gathered ridges, from 20 to 24 inches will be a sufficient depth for the pipe drain, and from 24 to 30 inches for the wedge drain. Particular care should be taken in connecting the small and main drains together, so as the water may have a gentle declivity with free access into the main drains.

When the drains are finished, the ridges are cleaved down upon the drains by the plough; and where they had been very high formerly, a second clearing may be given; but it is better not to level the ridges too much, for by allowing them to retain a little of their former shape, the ground being lowest immediately where the drains are, the surface water collects upon the top of the drains; and, by shrinking into them gets freely away. After the field is thus finished, run the new ridges across the small drains, making them about 9 or 10 feet broad, and continue afterwards to plough the field in the same manner as dry land.

It is evident from the above method of draining, that the expense will vary very much, according to the quantity of main drains necessary for the field, the distance of the small drains from each other, and the distance the turf is to be carried. In general, when the drains are about 20 feet asunder, the cost will be about 2*l.* 2*s.* per acre, for cutting, &c., and 1*l.* 1*s.* per acre for cartage of turf.

The advantage resulting from underdraining, is very great; for besides a considerable saving annually of water furrowing, cross cutting, &c., the land can often be ploughed and sown to advantage, both in the spring and in the fall of the year, when otherwise it would be found quite impracticable; every species of drilled crop, such as beans, potatoes, turnips, &c., can be cultivated successfully; and every species, both of green and white crops, is less apt to fail in wet and untoward seasons.

To drain lands.

Wherever a burst of water appears in any particular spot, the sure and certain way of getting quit of such an evil is to dig hollow drains, to such a depth below the surface as is required by the fall or level that can be gained, and by the quantity of water expected to proceed from the burst or spring. Having ascertained the extent of water to be carried off, taken the necessary levels, and cleared a mouth, or leading passage for the water, begin the drain at the extremity next to that leader, and go on with the work till the top of the spring is touched, which probably will accomplish the intended object. But if it should not be completely accomplished, run off from the main drain with such a number of branches, as may be required to intercept the water, and, in this way, disappointment will hardly be experienced. Drains, to be substantially useful, should seldom be less than three feet in depth, twenty or twenty-four inches thereof to be close packed with stones or wood, according to circumstances. The former are the best materials, but in many places are not to be got in sufficient quantities; recourse, therefore, must often be made to the latter, though not so effectual or durable.

It is of vast importance to fill up drains as fast as they are dug out; because if left open for any length of time, the earth is not only apt to fall in, but the sides get into a broken irregular state, which cannot afterwards be completely rectified. It also deserves attention, that a proper covering of straw or sod should be put upon the top of the materials, to keep the surface earth from mixing with them; and where wood is the material used for filling up, a double degree of attention is necessary, otherwise the proposed improvement may be effectually frustrated.

Pit draining.

The pit method of draining is a very effectual one, if executed with judgment. When it is sufficiently ascertained where the bed of water is deposited, which can easily be done by boring with an auger, sink a pit into the place, of a size which will allow a man freely to work within its bounds. Dig this pit of such a depth as to reach the bed of the water meant to be carried off: and when this depth is attained, which is easily discerned by the rising of the water, fill up the pit with great land-stones, and carry off the water by a stout drain to some adjoining ditch or mouth, whence it may proceed to the nearest river.

Mr. Bayley's directions for draining land.

First make the main drains down the slope or fall of the field. When the land is very wet, or has not much fall, there should in general be two of these to a statute acre; for the shorter the narrow drains are, the less liable they are to accidents. The width of the trench for the main drains should be thirty inches at top, but the width at the bottom must be regulated by the nature and size of the materials to be used. If the drain is to be made of bricks ten inches long, three inches thick, and four inches in breadth, then the bottom of the drain must be twelve inches: but if the common sale bricks are used, then the bottom must be proportionably contracted. In both cases there must be an interstice of one inch between the bottom bricks and the sides of the trench, and the vacuity must be filled up with straw, rushes, or loose mould. For the purpose of making these drains, the bricks should be moulded ten inches long, four broad, and three thick; which dimensions always make the best drain.

To construct main drains.

When the ground is soft and spongy, the bottom of the drain is laid with bricks placed across. On these, on each side, two bricks are laid flat, one upon the other, forming a drain six inches high, and four broad, which is covered with bricks laid flat. When stones are used instead of bricks, the bottom of the drain should be about eight inches in width; and in all cases the bottom of main drains ought to be sunk four inches below the level of the narrow ones, whose contents they receive, even at the point where the latter fall into them.

The main drains should be kept open or uncovered till the narrow ones are begun from them, after which they may be finished; but before the earth is returned upon the stones or bricks, it is advisable to throw in straw, rushes, or brushwood, to increase the freedom of the drain. The small narrow drains should be cut at the distance of sixteen or eighteen feet from each other, and should fall into the main drain at very acute angles, to prevent any stoppage. At the point where they fall in, and eight or ten inches above it, they should be made firm with bricks or stone. These drains should be eighteen inches wide at the top, and sixteeen at bottom.

To fill drains.

The completest method yet known, is to cut the strongest willows, or other aquatic brushwood, into lengths of about twenty inches, and place them alternately in the drain, with one end against one side of the bottom, and the other leaning against the opposite side. Having placed the strong wood in this manner, fill up the place between them, on the upper side, with the small brush wood, upon which a few rushes or straw being laid, as before mentioned, the work is done. Willow, alder, asp, or beach boughs, are exceedingly durable if put into the drain green, or before the sap is dried; but if they are suffered to become dry, and then laid under ground, a rapid decay is the consequence,

As in some situations it is an object of great importance to save the expense of materials commonly used in filling drains, a variety of devices have, with that view, been adopted. One of these is of the following nature: A drain is first dug to the necessary depth, narrow at bottom. Into the trench is laid a smooth tree, or cylindrical piece of wood, twelve feet long, six inches diameter at the one end, and five at the other, having a ring fastened into the thickest end. After strewing a little sand upon the upper side of the tree, the clay, or toughest part of the contents of the trench, is first thrown in upon it, and after that the remainder of the earth is fully trodden down. By means through the ring, the tree is then drawn out to within a foot or two of the smaller or hinder end; and the same operation is repeated till the whole drain is complete. Such a drain is said to have conducted a small run of water a considerable way under ground, for more than 20 years, without any sign of failure.

To water meadows.

The water should be set on in the month of October; and also as early in that month as possible. The effects of this watering are very important in strengthening the roots and stalks of the plants, and preparing them for shooting up strong and vigorous, next spring; and the blades that now rise, form a rough coat against winter, protecting the vital powers of the plants from the severity of that season. It sometimes happens also, that by delaying the watering process too long, early frosts supervene, and very much impede or prevent the operation. The floods of autumn are very enriching to meadows; but this benefit is lost sight of, to a certain degree, when the process of watering is delayed too long. Indeed the latter pasturage of meadows may generally be consumed early in October; and what may then remain is of no importance, compared with the advantages to be derived from early watering. Besides, if the meadow must be watered in separate divisions, and at different periods, it must happen, that by delaying the operation till November, some parts of the meadow may receive no water sooner than December or January: and if these months are very severe, it may be wholly impracticable to complete the process at that season.

If the land is fine and rich, it will generally be found, that three weeks may be sufficient for the first turn; if sour and course, four weeks may be necessary. The verdure will then be fine, and the soil rich and yielding. If scum appear on the grass, the water must be instantly removed.

Should the water not overflow properly, stops must be placed in the small feeders. These are either of stones or stakes, either of which are firm and durable. Sods rise and float away; and boards are seldom firm enough, though at times they may answer well. If the water, after all, does not flow properly over, notches must be cut, in order to make passages for it.

Separate divisions of meadow occupy the water in succession throughout winter; during which, they ought all to have received one turn of the water, as above recommended, if not given in later than autumn.

In severe frosts, it is not very safe to remove the water, as it operates so far to protect the grass; and if exposed wet to frost, it might be greatly injured. If it be necessary to alter the water in such weather, let it be done in the morning of a dry day.

In spring every division of the meadow requires to be again watered; and the fine rich verdure that appears, with the soft unctuous tread of the soil, are indications of advantage being obtained; but the appearance of a white scum warns the floater instantly to remove the water.

To form inclosures.

Inclosures, with some trifling exceptions, are formed in this country by building stone walls, or planting thorn edges. According to the first method, the walls are either of dry stone, or of stone and lime; and in the last instance lime is either used only in bedding the outward part of the wall, or applied to the whole of it, as circumstances may render necessary. These walls are either coped with sod, or have a cope which tapers to the top, closely built with stone and lime, or the coping is executed with large irregular stones, according to the taste and dispositions of the persons by whom they are erected. A wall built with stone and lime is undoubtedly the preferable fence; but the expense far exceeds the value of the interest which a tenant generally has in the premises. Such walls ought therefore, in every case, to be erected by the proprietor, who thus increases the value of his property, in a direct proportion with the increased value given to the land, by the erection of such fences.

To render a stone wall useful as a fence, its height ought never to be less than 5 feet 3 inches, otherwise it will not keep in many of the breeds of sheep which prevail in the country. In erecting the fence, great care ought to be taken to build upon a solid foundation, otherwise the wall is apt to incline to a side, and gradually to fall down. The coping should be made close; for if the water gets down the inside of the wall, it will bulge out, and finally go to ruin.

To plant thorn hedges.

When a thorn hedge is to be planted, it is of advantage to fallow the ground a year before hand; and if the soil is poor, to dress it with dung, so that the young plants may not be oppressed with weeds, or stunted for want of food, when weak and unable to send forth their fibres in search of nourishment. These things being attended to, and the hedge planted, an annual cleaning ought to be given; sometimes two cleanings are necessary before the hedge will thrive. It is also necessary to fence it at the back with paling, that beasts may be restrained from going over it, and to switch it over when 2 or 3 years of age, in order that it may be kept close at the bottom.

As the hedge grows up, repeated cuttings are necessary, so that a wide bottom may be gained, without which no hedge can be considered as a suitable fence; and some attention is required to give a proper shape to the top, which is a matter of much importance to the welfare of the hedge. When thorns are allowed to grow to unequal heights, the strong plants are sure to smother the weak ones; and when the hedge becomes broad at the top, it retains water and snow, to the great injury of the plant. All these evils may be avoided by proper management; though 12 years must elapse before the best-managed hedge can be considered as a sufficient fence.

To protect young thorn hedges.

The expense of protecting young hedges from cattle, by paling and railing, have always appeared to be too great, and, at the same time an unnecessary consumption of wood and nails. It occurred to Mr. Moore, steward to the Marquis of Bute, that a more economical protection might be effected, by forming a small earthen dike upon the side of the ditch, opposite the line of thorns, sufficiently high to prevent cattle getting into the ditch. Accordingly, some years ago, he tried the experiment, and found it completely to answer his expectation.

The materials of this sort of protection being always on the ground, it is attended with no expense but the workmanship, and the want of the use of the land occupied by this small ditch, for the time required, will be much more than compensated by the saving of paling, railing, workmanship, and nails. Mr. Moore has also practised with success, in parts where dead thorns, or brush for cocking, are scarce, the placing of stones across the top of the dike, instead of the usual cocking: Those stones, after having served their purpose, will be useful for drains or dikes where improvements are carrying on.

To form a plantation.

When a plantation of timber is to be formed, the first step necessary is to fence the ground that is to be planted, so that cattle of all kinds may be kept from making inroads. The ground to be planted ought to be completely fallowed on the preceding year, and, if in a rough or waste state, two years fallowing will be useful. If wet or boggy, open drains are to be dug through all the hollow places, so that superfluous moisture may be removed. These operations being performed, the planting may proceed, in executing which, great care should be taken to make the pits of a proper size; and, in filling them up, that the best earth be returned nearest the roots. A mixture of timber, in the same plantation, is always advantageous, and thick planting is eligible for the purpose of affording shelter. As the plantation gets forward, attention must be paid to thinning and pruning the trees, removing always those first that are either sickly or debilitated; and, in this way, and by exercising constant attention in the management, timber trees will advance with double rapidity, than when neglected and overlooked.

Much expense is often incurred in planting trees, which is afterwards lost by neglecting to train them up. Trees, indeed, are, in most cases, put into the earth, and then left to themselves, to grow or die; whereas with them, as with all other plants, the fostering hand of man is indispensably called for in every stage of growth, otherwise they will rarely arrive at perfection, or make that return to the owner which may be reasonably expected, when the several processes of planting, pruning, and thinning, are duly exercised.

Planting trees in hedge-rows is not only prejudicial to fences, but of great detriment to corn crops cultivated in fields surrounded by these hedge-rows, especially if the fields are of a small size. If shelter is wanted for a field, the best way of procuring it is to form belts or strips, of planting, from 50 to 60 feet wide; for timber trees thrive much better than when planted in rows or narrow stripes. All cold or moorish soils, are greatly benefited by being inclosed in this way; though it may be remarked, that small inclosures ought to be avoided, because they occasion a great waste of ground without affording a benefit in other respects proportional to the heavy expense entailed upon the proprietor or tenant, for supporting such a number of unnecessary fences.

The best method of raising oaks.

The Dutchess of Rutland has received the gold medal of the Society for the encouragement of Arts, Manufactures, and Commerce, for experiments in raising oaks. After five several experiments, her grace is of opinion that the best method is, "to sow the acorns where they are to remain, and, after hoeing the rows two years, to plant potatoes, one row only between each row of oaks, for three years. The benefit to the oaks from planting potatoes is incalculable; for, from the said experiments, and from others made at the same time, and with the same seedling oaks, planted with a mixture of larch, spruce, beech, birch, and other forest trees, and also with oaks only—in all cases she has found that potatoes between the rows are so superior to all other methods, that the oaks will actually grow as much the first 4 years with them, as in six without them. "It appears," she observes, "that the great secret in raising plantations of oaks is, to get them to advance rapidly the first 8 years from seed, or the first 5 years from planting, so as the heads of the trees are completely united, and become a smothering crop; after this is effected, the trees will appear to strive to outgrow each other, and will advance in height rapidly; they will be clean straight trees, to any given height: experiments have proved the fact, which may be verified by viewing Belvoir."

RURAL AND DOMESTIC ECONOMY.

TO MANAGE A DAIRY.

Improved mode of feeding and milking cows, near Farnham in Surry.

Directions to the cow feeder.

Go to the cow-stall at 6 o'clock in the morning, winter and summer; give each cow half a bushel of the mangel-wurzel, carrots, turnips, or potatoes, cut; at 7 o'clock, the hour the dairy maid comes to milk them, give each some hay, and let them feed, till they are all milked.—If any cow refuses hay, give her something she will eat, such as grains, carrots, &c. during the time she is milking, as it is absolutely necessary the cow should feed whilst milking. As soon as the woman has finished milking in the morning, turn the cows into the airing ground, and let there be plenty of fresh water in the troughs; at 9 o'clock give each cow 3 gallons of the mixture, (as under: to 8 gallons of grain add 4 gallons of bran or pollard;) when they have eaten that, put some hay into the cribs; at 12 o'clock give each 3 gallons of the mixture as before; if any cow looks for more, give her another gallon; on the contrary if she will not eat what you gave her, take it out of the manger, for never at one time let a cow have more than she will eat up clean.—Mind and keep the mangers clean, that they do not get sour. At 2 o'clock give each cow half a bushel of carrots, mangel-wurzel, or turnips; look the turnips, &c. &c. over well, before giving them to the cows, as one rotten turnip will give a bad taste to the milk, and most likely spoil a whole dairy of butter. At 4 o'clock put the cows into the stall to be milked; feed them on hay as you did at milking-time in the morning, keeping in mind that the cow whilst milking must feed on something. At 6 o'clock give each cow 3 gallons of the mixture as before. Rack them up at 8 o'clock. Twice in a week put into each cow's feed at noon, a quart of malt-dust.

⁎ The daily expense of subsisting each cow on the above feed will be about two shillings.

Directions to the dairy maid.

Go to the cow-stall at 7 o'clock; take with you cold water and a sponge, and wash each cow's udder clean before milking; dowse the the udder well with cold water, winter and summer, as it braces, and repels heats. Keep your hands and arms clean. Milk each cow as dry as you can, morning and evening, and when you milk each cow as you suppose dry, begin again with the cow you first milked, and drip them each; for the principal reason of cows failing in their milk is from negligence in not milking the cow dry, particularly at the time the calf is taken from the cow. Suffer no one to milk a cow but yourself, and have no gossiping in the stall. Every Saturday night give an exact account of the quantity of milk each cow has given in the week.

To make oats prove doubly nutritious to horses.

Instead of grinding the oats, break them in a mill; and the same quantity will prove doubly nutritious. Another method is, to boil the corn, and give the horses the liquor in which it has been boiled; the result will be, that instead of 6 bushels in a crude state, 3 bushels so prepared will be found to answer, and to keep the animals in superior vigour and condition.

Cheap method of rearing horned cattle.

After having expressed the oil from the linseed, make up the remaining husks or dross into round balls of the size of a fist, and afterwards dry them; infuse and dissolve two or three of these balls in hot water, and add in the beginning a third or fourth part of fresh milk, but afterwards when the calves are grown, mix only skim milk with the infusion.

To rear calves.

The best method of rearing calves, is to take them off the cows in three weeks or a month, and to give them nothing but a little fine hay, until they begin through necessity to pick a little: then cut some of the hay and mix it with bran or oats in a trough, and slice some turnips about the size of a crown piece, which they will soon by licking learn to eat: after which give them turnips enough.

To rear calves without milk.

In two or three days after they are calved take the calves from the cows, put them in a house by themselves, then give them a kind of water gruel, composed of about one-third of barley and two-thirds of oats ground together very fine, then sift the mixture through a very fine sieve, put it into the quantity of water below mentioned, and boil it half an hour, when take it off the fire, and let it remain till it is milkwarm; then give each calf about a quart in the morning, and the same quantity in the evening, and increase it as the calf grows older. It requires very little trouble to make them drink it; after the calves have had this diet about a week or ten days, tie up a little bundle of hay and put it in the middle of the house, which they will by degrees come to eat: also put a little of the meal above mentioned in a small trough for them to eat occasionally; keep them in this manner until they are of proper age to turn out to grass, before which they must be at least two months old.

Another method.

Make an infusion of malt, or fresh wort as a substitute for milk, in summer it may be given to the calves cold, but in winter it must have the same degree of warmth as the milk just coming from the cow; the quantity is the same as the milk commonly given at once to a calf, and to be increased in proportion as the calf grows.

To fatten poultry.

An experiment has lately been tried of feeding geese with turnips cut in small pieces like dice, but less in size, and put into a trough of water; with this food alone, the effect was that 6 geese, each when lean weighing only 9 lbs., actually gained 20 lbs. each in about 3 weeks fattening.

Malt is an excellent food for geese and turkeys, grains are preferred for the sake of economy, unless for immediate and rapid fattening: the grains should be boiled afresh.

Other cheap articles for fattening are oatmeal and treacle; barley-meal and milk; boiled oats and ground malt.

Corn before being given to fowls should always be crushed and soaked in water. The food will thus go further, and it will help digestion. Hens fed thus have been known to lay during the whole of the winter months.

To choose a milch cow.

As to a CHOICE of BREEDS for a private family, none in England, (says Mr. Lawrence,) probably combine so many advantages as the Suffolk dun-cows. They excel both in quantity and quality of milk; they feed well after they become barren; they are small-sized, and polled or hornless; the last a great convenience. The horns of cows which butt and gore others, should be immediately broad tipped. There is a breed of polled Yorkshire or Holderness cows, some of them of middling size, great milkers, and well adapted to the use of families, where a great quantity of milk is required, and where price is no object, and food in plenty. If richer milk and a comparison of the two famous breeds be desired, one of each may be selected, namely, the last mentioned, and the other of the midland county, or long horned species. Colour is so far no object, that neither a good cow nor a good horse can be of a bad colour; nevertheless, in an ornamental view, the sheeted and pied stock of the Yorkshire short-horns, make a picturesque figure in the grounds.

The Alderny cows yield rich milk upon less food than larger stock, but are seldom large milkers, and are particularly scanty of produce in the winter season. They are, besides, worth little or nothing as barreners, not only on account of their small size, but their inaptitude to take on fat, and the ordinary quality of their beef.

To determine the economy of a cow.

The ANNUAL CONSUMPTION of food per cow, if turned to grass, is from one acre to an acre and a half in the summer, and from a ton to a ton and a half of hay in the winter. A cow may be allowed 2 pecks of carrots per day. The grass being cut and carried, will economize it full one-third. The ANNUAL PRODUCT of a good fair dairy cow, during several months after calving, and either in summer or winter, if duly fed and kept in the latter season, will be an average of seven pounds of butter per week, from five to three gallons of milk per day. Afterwards, a weekly average of three or four pounds of butter from barley, half the quantity of milk. It depends on the constitution of the cow, how nearly she may be milked to the time of her calving, some giving good milk until within a week or two of that period, others requiring to be dried 8 or 9 weeks previously. I have heard (says Mr. Lawrence) of 20 lbs. of butter, and even 22 lbs. made from the milk of one long-horned cow in seven days: but I have never been fortunate enough to obtain one that would produce more than 12 lbs. per week, although I have had a Yorkshire cow which milked seven gallons per day, yet never made 5 lbs. of butter in one week. On the average, three gallons of good milk will make 1 lb. of butter.

To breed Pheasants.

Eggs being provided, put them under a hen that has kept the nest three or four days: and if you set two or three hens on the same day, you will have the advantage of shifting the good eggs. The hens having set their full time, such of the young pheasants as are already hatched, put into a basket, with a piece of flannel, till the hen has done hatching. The brood, now come, put under a frame with a net over it, and a place for the hen, that she cannot get to the young pheasants, but that they may go to her; and feed them with boiled egg cut small, boiled milk and bread, alum curd, ant's eggs, a little of each sort, and often. After 2 or 3 days they will be acquainted with the call of the hen that hatched them, may have their liberty to run on the grass-plat, or elsewhere, observing to shift them with the sun, and out of the cold winds; they need not have their liberty in the morning till the sun is up; and they must be shut in with the hen in good time in the evening. You must be very careful in order to guard against the distemper to which they are liable, in the choice of a situation for breeding the birds up; where no poultry, pheasants, or turkeys, &c. have ever been kept: such as the warm side of a field, orchard, pleasure ground, or garden, or even on a common, or a good green lane, under circumstances of this kind; or by a wood side; but then it is proper for a man to keep with them under a temporary hovel, and to have two or three dogs chained at a proper distance, with a lamp or two at night.

The birds going on as before mentioned, should so continue till September, or (if very early bred), the middle of August. Before they begin to shift the long feathers in the tail, they are to be shut up in the basket with the hen regularly every night. For such young pheasants as are chosen for breeding stock at home, and likewise to turn out in the following spring, provide a new piece of ground, large and roomy for two pens where no pheasants, &c. have been kept, and there put the young birds in as they begin to shift their tails. Such of them as are intended to be turned out at a future time, or in another place, put into one pen netted over, and leave their wings as they are; and those wanted for breeding put into the other pen, cutting one of the wings of each bird. The gold and silver pheasants pen earlier, or they will be off. Cut the wing often; and when first penned feed all the young birds with barley-meal, dough, corn, plenty of green turnips, and alum curd, to make which take new milk, as much as the young birds require, and boil it with a lump of alum, so as not to make the curd hard and tough, but custardlike.

A little of this curd twice a day, and ants' eggs after every time they have had a sufficient quantity of the other food. If they do not eat heartily, give them some ants' eggs to create an appetite, but by no means in such abundance as to be considered their food.

Not more than four hens should be allowed in the pens to one cock. Never put more eggs under a hen than she can well and closely cover; the eggs being fresh and carefully preserved. Short broods to be joined and shifted to one hen; common hen pheasants in close pens, and with plenty of cover, will sometimes make their nests and hatch their own eggs; but they seldom succeed in rearing their brood, being so naturally shy; whence, should this method be desired, they must be left entirely to themselves, as they feel alarm even in being looked at. Eggs for setting are generally ready in April. Period of incubation the same in the pheasant as in the common hen. Pheasants, like the pea-fowl, will clear grounds of insects and reptiles, but will spoil all wall-trees within their reach, by pecking off every bud and leaf.

Strict cleanliness to be observed, the meat not to be tainted with dung, and the water to be pure and often renewed. Food for grown pheasants, barley or wheat; generally the same as for other poultry. In a cold spring, hemp seed or other warming seeds are comfortable, and will forward the breeding stock.

To manage young chickens.

The chickens first hatched, are to be taken from the hen, lest she be tempted to leave her task unfinished. They may be secured in a basket of wool or soft hay, and kept in a moderate heat, if the weather be cold, near the fire. They will require no food for 24 hours, should it be necessary to keep them so long from the hen. The whole brood being hatched, place the hen under a coop abroad, upon a dry spot, and, if possible, not within reach of another hen, since the chickens will mix, and the hens are apt to maim and destroy those which do not belong to them. Nor should they be placed near young fowls, which are likely to crush them, being always eager for their small meat.

The first food should be split grits, afterwards tail wheat, all watery food, soaked bread, or potatoes, being improper. Eggs boiled hard, or curd chopped small, is very suitable for first food. Their water should be pure and often renewed, and there are pans made in such forms, that the chickens may drink without getting into the water, which, by wetting their feet and feathers, numbs and injures them; a basin in the middle of a pan of water, will answer the end; the water running round it. There is no necessity for cooping the brood beyond two or three days; but they may be confined as occasion requires, or suffered to range, as they are much benefited by the foraging of the hen. They should not be let out too early in the morning, whilst the dew lies upon the ground, nor be suffered to range over wet grass, which is a common and fatal cause of disease in fowls. Another caution requisite is to guard them against unfavourable changes of the weather, particularly if rainy. Nearly all the diseases of fowls arise from cold moisture.

For the period of the chickens quitting the hen, there is no general rule, when she begins to roost, if sufficiently forward, they will follow her; if otherwise, they should be secured in a proper place, till the time arrives when they are to associate with the other young poultry, since the larger are sure to overrun and drive from their food the younger broods.

To hatch chickens in the Egyptian mode.

The *mamals* or ovens of Egypt are scarcely above nine feet in length, but they have an extent in length and breadth which renders them remarkable, and yet they are more so in their internal structure. The centre of the building is a very narrow gallery, usually about the width of three feet, extending from one end of the building to the other, the height of which is from eight to nine feet; the structure for the most part of brick. The entrance into the oven is through the gallery, which commands the whole extent of it, and facilitates the several operations that are necessary to keep the eggs to the proper degree of heat. The oven has a door, not very wide, and only as high as it is broad; this door, and many others in use in the mamals, are commonly no more than round holes.

The gallery is a corridor, with this difference from our common corridors, which have only one row of rooms, whereas that of the mamal has always two rows of them on both sides; namely, one on the ground floor and another above. Every one upon the ground floor has one above, perfectly equal, both in length and breadth. The rooms of each row on the ground floor, are all equal, in length, breadth, and height. Reaumur observes, we know of no other rooms in the world, so low as these, being only three feet in height. Their breadth, which is in the same direction with the length of the gallery, is four or five feet; they are very narrow in proportion to their length, which is 12 or 15 feet.

Every one of these rooms has its door, or round aperture, about a foot and a half in diameter, opening into the gallery, the hole being wide enough for a man to creep through. All the eggs to be hatched are first ranged in these rooms. Four or five thousand eggs are put into each of them. These are the real ovens, so that the whole edifice, which is denominated a chicken oven, is an assemblage of many ovens set together, side by side, opposite, and over each other; and in the course of the process a part of the eggs are warmed in the upper rooms, after having been previously in the lower.

Forty or fifty thousand eggs are hatched at once, or another extends the number to eighty thousand. The eggs aro spread on mats, flocks or flax, in each room upon the ground floor, where they contract their first and general warmth, during a certain number of days.

The heat of the air, in the inferior rooms and consequently that of the eggs, would rise to an excessive degree were the fire in the gutter incessantly kept up. They keep it up only an hour in the morning, and an hour at night, and they style these heatings the dinner and supper of the chickens: they receive, however, two more meals, that is, luncheon and afternoon meal, the fire being lighted four times a day.

On the day on which they cease to light the fires, part of the eggs of each inferior room are always conveyed into the room above. The eggs had been too much heaped in the former, and it is now time to extend and give them more room.

The proper number of eggs from each inferior room having been removed into the room above, all the apertures of the rooms and of the gallery are closely and exactly stopped with bungs of tow, excepting, perhaps, half the apertures in the arches or ceilings of the upper rooms; which are left open in order to procure there a circulation of air. This precaution is sufficient to preserve in the ovens, for many days together, the temperature which has been obtained; which indeed would be the case with ovens upon so considerable a scale in any country, more especially one so hot as Egypt.

Three hundred and eighty-six ovens are kept in Egypt annually, during four or six months, allowing more time than is necessary to hatch eight successive broods of chickens, ducks, and turkeys, making on the whole, yearly, three thousand and eighty-eight broods. The number in each hatching is not always equal, from the occasional difficulty of obtaining a sufficient number of eggs which may be stated at a medium between the two extremes of forty and eighty thousand to each oven.

The overseer contracts to return, in a living brood to his employer, two-thirds of the number of eggs set in the ovens: all above being his own perquisite, in addition to his salary for the season, which is from 30 to 40 crowns exclusive of his board. According to report, the crop of poultry thus artificially raised in Egypt, was seldom, if ever, below that ratio, making the enormous annual amount of ninety-two millions six hundred and forty thousand.

The chickens are not sold from the stove by tale, but by the bushel, or basket full!

Excellent substitute for candles.

Procure meadow-rushes, such as they tie the hop shoots to the poles with. Cut them when they have attained their full substance, but are still green. The rush, at this age, consists of a body of pith, with a green skin on it. Cut off both ends of the rush, and leave the prime part, which, on an average, may be about a foot and a half long. Then take off all the green skin, except for about a fifth part of the way round the pith. Thus it is a piece of pith all but a little strip of skin in one part all the way up, which is necessary to hold the pith together.

The rushes being thus prepared, the grease is melted, and put, in a melted state, into something that is as long as the rushes are. The rushes are put into the grease; soaked in it sufficiently; then taken out and laid in a bit of bark, taken from a young tree, so as not to be too large. This bark is fixed up against the wall by a couple of straps put round it: and there it hangs for the purpose of holding the rushes.

The rushes are carried about in the hand; but to sit by, to work by, or to go to bed by, they are fixed in stands made for the purpose, some of which are high, to stand on the ground, and some low, to stand on a table. These stands have an iron part something like a pair of pliers to hold the rush in, and the rush is shifted forward from time to time, as it burns down to the thing that holds it.

These rushes give a better light than a common small dip candle: and they cost next to nothing, though the labourer may, with them, have as much light as he pleases.

To cultivate mustard.

A yard square of ground, sown with common mustard, the crop of which, ground for use in a little mustard-mill, as wanted, would save some money, and probably save life. The mustard would look brown instead of yellow; but the former colour is as good as the latter; and, as to the taste, the real mustard has certainly a much better taste than that of the drugs and flour, which go under the name of mustard. Let any one try it, and he will never use the drugs again. The drugs, if taken freely, leave a burning at the pit of the stomach, which the real mustard does not.

To cure herrings, pilchards, mackarel, sprats, &c.

Reservoirs of any size, vats, or casks, perfectly water-tight, should be about half filled with brine, made by dissolving about 28 parts of solid salt in 72 of fresh water. The fish, as fresh as possible, gutted or not, must be plunged into this fully-saturated brine, in such quantity as nearly to fill the reservoir; and, after remaining quite immersed for five or six days, they will be fit to be packed as usual, with large grained solid salt, and exported to the hottest climates. As brine is always weakest at the upper part, in order to keep it of an uniform saturation, a wooden lattice-work frame, of such size as to be easily let into the inside of the reservoir, is sunk an inch or two under the surface of the brine, for the purpose of suspending upon it lumps of 1 or 2 pounds, or larger, of solid salt, which effectually saturates whatever moisture may exude from the fish; and thus, the brine will be continued of the utmost strength, so long as any part of the salt remains undissolved. The solidity of the lumps admits of their being applied several times, or whenever the reservoirs are replenished with fish; and the brine, although repeatedly used, does not putrefy; nor do the fish, if kept under the surface, ever become rancid.

All provisions are best preserved by this method, especially bacon, which, when thus cured, is not so liable to become rusty, as when done by the usual method of rubbing with salt.

Portable ice-house.

Take an iron-bound butt, or puncheon, and knock out the head; then cut a very small hole in the bottom, about the size of a wine-cork. Place inside of it a wooden tub, shaped like a churn, resting it upon two pieces of wood, which are to raise it from touching the bottom. Fill the space round the inner tub with pounded charcoal; and fit to the tub a cover, with a convenient handle; having inside one or two small hooks, on which the bottles are to be hung, during the operation. Place on the lid a bag of pounded charcoal, about 2 feet square; and over all, place another cover, which must cover the head of the outer cask.

When the apparatus is thus prepared, let it be placed in a cold cellar, and buried in the earth above four-fifths of its height; but, though cold, the cellar must be dry; wet ground will not answer, and a sandy soil is the best. Fill the inner tub, or nearly so, with pounded ice; or, if prepared in winter, with snow well pressed down, and the apparatus will be complete.

Whenever it is wished to make ices, take off the upper cover, then the sack or bag of pounded charcoal, and suspend the vessel containing the liquid to be frozen to the hooks inside of the inner cover; then close up the whole as before, for half an hour, when the operation will be complete, provided care be taken to exclude external air.

To produce ice for culinary purposes.

Fill a gallon stone bottle with hot spring water, leaving about a pint vacant, and put in 2 oz. of refined nitre; the bottle must then be stopped very close, and let down into a deep well. After 3 or 4 hours it will be completely frozen; but the bottle must be broken to procure the ice. If the bottle is moved up and down, so as to be sometimes in and sometimes out of the water, the consequent evaporation will hasten the process. The heating of the water assists the subsequent congelation; and experience has proved, that hot water in winter will freeze more rapidly than cold water just drawn from a spring.

To make ice.

The following is a simple and speedy method of congealing water:—

Into a metal vase half filled with water, pour very gently an equal quantity of ether, so that no mixture may take place of the two liquids. The vase is placed under the receiver of an air-pump, which is so fixed upon its support as to remain quite steady when the air is pumped out.

At the first strokes of the piston, the ether becomes in a state of ebullition; it is evaporated totally in less than a minute, and the water remains converted into ice.

To procure ice from a powder.

This is made by pulverizing and drying the shivery fragments of porphyritic trap, which will absorb one-fifth of its own weight of water. Two quarts of it, spread in a large dish, will, in a few minutes, in an exhausted receiver, freeze half of three quarters of a pound of water, in a cup of porous earthen ware. After each process, its power will be restored by drying it before a fire, or in the sun; of course, ice may always be procured from it in hot climates. Experiments tried with oatmeal, have produced equal results.

To char peats at the moss.

The best method of charring peats where they are dug, is—when the peats are properly dried, wheel to the outside of the moss a single horse cart load of them. Level a spot of ground, about 7 feet in diameter, near to a drain, and drive a stake of wood into the ground, about 5 feet long; roll some dry heather or pol (the refuse of flax), round the stake, and, and lay some also upon the ground where the peats are to be placed;—then set the peats upon and all round the stake, inclining to the centre, with a little dry heather or pol between each floor of peat, until near the top, or last course: then they are laid in a horizontal direction; and the stack when finished, is in the form of a bee-hive. The next operation is to set the stack on fire, which is done at the bottom all round; the fire will soon run up the post in the centre; and when the heather or pol is all consumed, the space forms a chimney, and occasions the stack to burn regularly. If the wind-ward side should burn too fast, apply some wet turf. When the peats are thought to be sufficiently burnt, which is easily known from the appearance of the smoke, apply wet turf and water from the adjoining drain as fast as possible, until the whole be extinguished:—the charcoal may be removed upon the following day.

To char peats for family use.

When charcoal is required for cookery, or any other purpose in the family, take a dozen or fifteen peats, and put them upon the top of the kitchen fire, upon edge; they will soon draw up the coal fire, and become red in a short time. After being turned about once or twice, and done with smoking, they are charred, and may be removed to the stoves; if more char is wanted, put on another supply of peats. By following this plan, the kitchen fire is kept up, and thus with very little trouble, a supply of the best charred peat is obtained perfectly free from smoke; and the vapour by no means so noxious as charcoal made from wood. Peats charred in this way may be used in a chafer, in any room, or even in a nursery, without any danger arising from the vapour. It would also be found very fit for the warming of beds; and much better than live coals, which are, in general, used full of sulphur, and smell all over the house.

Peats charred in a grate, and applied to the purpose of charcoal immediately, without being extinguished, make the purest and best char, and freest of smoke. When peats are charrred in a large quantity, and extinguished, any part of the peat that is not thoroughly burnt in the heart, will imbibe moisture; and, when used, will smoke, and have a disagreeable smell, which would at once hinder charred peat from being used in a gentleman's family.

To make a cheap fuel.

Mix coal, charcoal, or saw-dust, one part, sand of any kind, two parts, marl or clay, one part, in quantity as thought proper. Make the mass up wet, into balls of a convenient size; and when the fire is sufficiently strong, place these balls according to its size, a little above the top bar; and they will produce a heat considerably more intense than common fuel; and ensure a saving of one half the quantity of coals. A fire then make up, will require no stirring, and will need no fresh fuel for ten hours.

To clean water casks.

Scour the inside well out with water and sand, and afterwards, apply a quantity of charcoal dust; another and better method is, to rinse them with a pretty strong solution of oil of vitriol and water, which will entirely deprive them of their foulness.

To preserve eggs.

Apply with a brush a solution of gum-arabic to the shells, or immerse the eggs therein, let them dry, and afterwards pack them in dry charcoal dust. This prevents their being affected by any alterations of temperature.

Another method.

Mix together in a tub, or vessel, one bushel, Winchester measure, of quick lime, thirty-two ounces of salt, eight ounces of cream of tartar, with as much water as will reduce the composition to a sufficient consistence, to float an egg. Then put and keep the eggs therein, which will preserve them perfectly sound for two years at least.

A substitute for milk and cream.

Beat up the whole of a fresh egg, in a basin, and then pour boiling tea over it gradually, to prevent its curdling. It is difficult from the taste, to distinguish the composition from rich cream.

To cure butter.

Take two parts of the best common salt, one part of sugar, and one part of salt-petre; beat them up and blend the whole together. Take one ounce of this composition, for every 16 ounces of butter, work it well into the mass, and close it up for use.

Butter cured this way, appears of a rich marrowy consistence, and fine colour, and never acquires a brittle hardness, nor tastes salt. It may likewise keep good three years, only observing, that it must stand three weeks or a month, before it is used.

To remove the turnip flavour from milk and butter.

Dissolve a little nitre in spring water, which keep in a bottle, and put a small tea-cup full into eight gallons of milk, when warm from the cow.

To make butter Dumbarton method.

First scald the churn with boiling water to ensure cleanliness, then having put in the cream, work it till the butter is separated from the milk, and put the former into a clean vessel. Next draw a corn sickle several times cross ways through it, for the purpose of extracting any hairs or superfluities which may adhere to it. Let the butter be put into spring water during this operation; which will prevent its turning soft; and which will clear it likewise from any remnants of milk. Next mix with every stone of butter, ten ounces of salt. Incorporate it well, otherwise the butter will not keep. In May and June, each stone of butter will take one ounce more of salt, but after the middle of August, one ounce less will suffice. When made, put it into a well-seasoned kit, and shake a handful of salt on the top, which will preserve it from mouldiness. In this way continue to make and salt the butter, placing one make upon the other, until the kit is full. Observe that the kit does not leak, as the liquor oozing through, would occasion the butter to spoil.

To make Cheshire cheese.

It is necessary in making the best cheese to put in the new milk without skimming, and if any overnight's milk be mixed with it, it must be brought to the same natural warmth; into this put as much rennet as is just sufficient to come to the curd, and no more; for on this just proportion the mildness of the cheese is said to depend, a piece dried of the size of a worn sixpence, and put into a tea-cupful of water with a little salt, about twelve hours before it is wanted, is sufficient for 18 gallons of milk. The curd is next broken down, and, when separated from the whey, is put into a cheese vat, and pressed very dry; it is next broken very small by squeezing it with the hands. New curd is mixed with about half its quantity of yesterday's, and which has been kept for that purpose. When the curds have been thus mixed, well pressed and closed with the hands in a cheese-vat, till they become one solid lump, it is put into a press for four or five hours, then taken out of the cheese vat and turned, by means of a cloth put into the same for this purpose, and again put into the press for the night. It is then taken out and layed upon a flag or board till the salt is quite melted, then it is wiped, put into a dry room, and turned every day, till it becomes dry enough for the market.

To correct damaged grain.

Put the injured article into an oven, from which the bread has been just drawn. Spread it in a bed, of from three to four inches in thickness, and stir it frequently with a shovel or rake, to facilitate the disengagement of the vapour. In ten or fifteen minutes, according to its humidity, withdraw it; when perfectly cool and aired, it will be restored to its wholesome qualities.

Another method.

Musty grain, totally unfit for use, and which can scarcely be ground, may be rendered perfectly sweet and sound by simply immersing it in boiling water, and letting it remain till the water becomes cold. The quantity of water must be double that of the corn to be purified. The musty quality rarely penetrates through the husk of the wheat; and in the very worst cases, it does not extend through the amylaceous matter which lies immediately under the skin. In the hot water, all the decayed or rotten grains swim on the surface, so that the remaining wheat is effectually cleaned from all impurities, without any material loss. It is afterwards to be dried, stirring it occasionally on the kiln.

To improve new seconds flour of bad quality.

Mix common carbonate of magnesia well, in proportions of from 20 to 40 grains to a pound of flour; calcined magesia will improve the bread, but not nearly to the same extent as the carbonate. It will improve the colour of bread made from new seconds flour, while it impairs the colour of bread from fine old and new flour.

To preserve flour.

Attach a number of lofts to every mill, so that the flour, in place of being thrust into sacks, the moment it escapes from the friction of the stones, may be taken up by the machinery, and spread out to cool in the most careful manner. The violent friction of the stones necessarily creates a great heat and steam; and if flour is thrust into sacks in this state, a chemical action will make it moist, and clammy.

To preserve wheat.

Kiln dry it and put it in cubical cases of earthenware, glazed on the outside, and filled full as possible; cover them by a piece of the same ware made to fit close, and secured with a mixture of pitch, tar, and hemp cloth, till the whole be made air tight. A case of this kind might be made which would hold four bushels or a quarter of wheat.

To correct moist flour.

In preparing the dough, let one-third of the flour be kept unmixed, till the dough begins to rise, then add a little of the flour, and when it rises again, add a little more, and so on for four or five hours, till the whole of the flour is used. In this manner the mixture, which occasions a glistening appearance in the dough, will be taken up, and the bread, as is already mentioned, will be highly improved.

To remove flies from rooms.

Take half a tea-spoonful of black pepper, in powder, one tea-spoonful of brown sugar, and one table-spoonful of cream; mix them well together, and place them in the room, on a plate where the flies are troublesome, and they will soon disappear.

To make excellent bread.

Mix seven pounds of best flour, with three pounds of pared boiled potatoes. Steam off the water, and leave them a few minutes on the fire, mash them fine, and mix them whilst quite warm in the flour, with a spoonful or more of salt. Put a quart of water, milk warm, with three large spoonsful of yeast, gradually to the potatoes and flour. Work it well into a smooth dough, and let it remain four hours before it is baked.

To make bread with a very small quantity of yeast.

Put one bushel of flour into the trough, mix three quarters of a pint of warm water, and one tea-spoonful of thick yeast well together; pour a small quantity in a hole made in the centre of the flour large enough to contain two gallons of water; then stir with a stick, about two feet long, some of the flour, until it is as thick as pudding batter. Strew some of the dry flour over it, and let it rest for an hour, then pour about a quart more water, and having stirred it as before, leave it for two hours, and then add a gallon more of warm water. Stir in the flour again, and in about four hours more, mix up the dough, and cover it warm; in about four hours more you may put it in the oven, and as light bread will be obtained as though a pint of yeast had been used.

To prepare bread in the method of the London bakers.

Sift a sack of flour into the kneading trough; add six pounds of salt, and two pounds of alum, dissolve them separately in a pailful of water (cooled to 90 degrees Fahr.) with two quarts of yeast. Stir it well, and strain it through a cloth or sieve; afterwards mix it with the flour into a dough, next cover it up with cloths and shut down the trough lid close to retain the heat. In two hours more, mix in another pailful of warm water with the sponge, and again cover it up for two hours. After this knead it for more than an hour, with three pailsful of warm water. Return the dough to the trough, sprinkle it with dry flour, and in four hour hour's time, knead it well for about half an hour, when it will be fit to mould into loaves.

To prepare household bread.

Mix four ounces of salt, three quarts of water, a pint of yeast, and a peck of second's flour, in a trough: when properly fermented, knead and divide it into loaves. Sometimes a portion of rye-meal, rice, flour, or boiled potatoes, are mixed with the flour previous to the kneading, the two former serve to bind the bread, the latter cause it to be open and spongy.

To produce one-third more bread from a given quantity of corn.

Boil a bushel of the coarsest bran, in seven gallons of water for one hour, keep stirring it, that it may not stick to the bottom, then pour it off into a trough, or tub full of holes, over which lay a coarse cloth or sieve. On the top of the whole put a wooden cover, with a weight sufficiently heavy to press out the liquor from the bran, which will sink to the bottom of the tub in a thick pulp. This liquor will contain the essential oil of the corn, and when kneaded in with a proper proportion of flour, it will yield one-third more than the same quantity would, made with water in the usual way.

To make French bread.

Put a pint of milk into three quarts of water. In winter let it be scalding hot, but in summer, little more than milk-warm: put in salt sufficient. Take a pint and a half of good ale yeast, free from bitterness, and lay it in a gallon of water the night before. Pour off the yeast into the milk and water, and then break in rather more than a quarter of a pound of butter. Work it well till it is dissolved; then beat up two eggs in a basin, and stir them in. Mix about a peck and a half of flour with the liquor, and, in winter, make the dough pretty stiff, but more slack in summer; mix it well, and the less it is worked the better. Stir the liquor into flour, as for pie-crust, and after the dough is made, cover it with a cloth, and let it lie to rise, while the oven is heating. When the loaves have lain in a quick oven about a quarter of an hour, turn them on the other side for about a quarter of an hour longer. Then take them out, and chip them with a knife, which will make them look spongy, and of a fine yellow, whereas rasping takes off this fine colour, and renders their look less inviting.

To make wholesome mixed bread.

Take of rice 3 lbs; boil it in a sufficient quantity of water till reduced to a soft pulp, then rub it with 6 lbs. of mealy potatoes, cooked by steam, and, when well blended, add 6 lbs. of flour; make the whole into a dough with water, and ferment with yeast, in the usual manner.

To make bran bread.

To four pounds of best household flour, put two table spoonsful of small beer yeast, and a half pint of warm water; let it stand two hours in a warm place. Add half a pound of bran, and a tea-spoonful of salt; make the dough with skim milk or warm water; cover it up, and let it stand an hour. Put the loaves into warm dishes, and let them stand 20 minutes before they go into the oven.

Another method.

Mix with half a peck of flour, containing the whole of the bran, a quarter of a pint of small beer yeast, and a quart of lukewarm water; stir it well with a wooden spoon until it becomes a thick batter, then put a napkin over the dough, and set it about three feet from the fire, until it rises well. Add, if requisite, a little more warm water, strew over it a table-spoonful of salt, and make the whole into a stiff paste. Put it to the fire, and when it rises, again knead it into the dough. If baked in tins, the loaves will be improved.

To make leaven bread.

Take about two pounds of dough of the last making, which has been raised by barm: keep it in a wooden vessel, covered well with flour. This will become leaven when sufficiently sour. Work this quantity into a peck of flour with warm water. Cover the dough close with a cloth, or flannel, and keep it in a warm place; further mix it next morning with two or three bushels of flour, mixed up with warm water and a little salt. When the dough is thoroughly made, cover it as before. As soon as it rises, knead it well into loaves. Observe in this process, that the more leaven is put to the flour, the lighter the bread will be, and the fresher the leaven, the less sour it will taste.

To make four quartern loaves for family use.

Procure a peck of flour, with which mix a handful of salt to three quarts of water, and add half a pint of good fresh yeast. Work the whole well together, and set it to rise at a moderate distance from the fire, from two to three hours. Then divide it into four equal parts, put it into tins, and send it to the baker's.

The London bakers, to give their flour a factitious whiteness, boil alum in the water; but such means will not be resorted to in any private family.

To make cheap bread.

Take pumpkins, and boil them in water until it is quite thick, and, with the decoction mix flour so as to make dough. This makes an excellent bread. The proportion is increased at least one-fourth, and it keeps good a length of time.

Another method.

Birkenmayer, a brewer of Constance, has succeeded in manufacturing bread from the farinaceous residue of beer. Ten pounds of this species of paste, one pound of yeast, five pounds of ordinary meal, and a handful of salt, produce 12 pounds of black bread, both savoury and nourishing.

To make bread of Iceland moss and flour.

This vegetable may be used alone, or with flour, in the making of bread. Boil seven pounds of lichen meal in 100 pints of water; and afterwards mix the same with 69 lbs. of flour, and when baked, the product will be 160 lbs. of good household bread. Whereas, without this addition, the flour would not produce more than 79 lbs. of bread. To prepare it, use 1 lb. of lichen meal in the form of paste, to about 3 3-4 lbs. of flour.

To make bread on Mr. Cobbett's plan.

Suppose the quantity be a bushel of flour. Put this flour into a trough that people have for the purpose, or it may be in a clean smooth tub of any shape, if not too deep, and sufficiently large. Make a pretty deep hole in the middle of this heap of flour. Take (for a bushel) a pint of good fresh yeast, mix it and stir it well up in a pint of soft water milk-warm. Pour this into the hole in the heap of flour. Then take a spoon and work it round the outside of this body of moisture, so as to bring into it by degrees flour enough to make it form a thin batter, which must be stirred about well for a minute or two. Then take a handful of flour and scatter it thinly over the head of this batter, so as to hide it. Then cover the whole over with a cloth to keep it warm; and this covering, as well as the situation of the trough, as to distance from the fire, must depend on the nature of the place and state of the weather, as to heat and cold. When the batter has risen enough to make cracks in the flour, begin to form the whole mass into dough, thus: begin round the hole containing the batter, working the flour into the batter, and pouring in, as it is wanted to make the flour mix with the batter, soft water milk-warm, or milk. Before beginning this, scatter the salt over the heap, at the rate of half a pound to a bushel of flour. When the whole is sufficiently moist, knead it well. This is a grand part of the business: for, unless the dough be well worked, there will be little round lumps of flour in the loaves; and besides the original batter, which is to give fermentation to the whole, will not be duly mixed. It must be rolled over, pressed out, folded up and pressed out again, until it be completely mixed, and formed into a stiff and tough dough.

When the dough is made, it is to be formed into a lump in the middle of the trough, and, with a little dry flour thinly scattered over it, covered over again to be kept warm and to ferment; and in this state, if all be done rightly, it will not have to remain more than about 15 or 20 minutes.

The oven should be hot by the time that the dough has remained in the lump about 20 minutes. When both are ready, take out the fire and wipe the oven clean, and, at nearly the same moment, take the dough out upon the lid of the baking trough, or some proper place, cut it up into pieces, and make it up into loaves, kneading it again in these separate parcels: shaking a little flour over the board, to prevent the dough adhering to it. The loaves should be put into the oven as quickly as possible after they are formed; when in, the oven lid or door should be fastened up very closely; and, if all be properly managed, loaves, of about the size of quartern loaves, will be sufficiently baked in about two hours. But they usually take down the lid, and look at the bread, in order to see how it is going on.

To detect adulteration in bread.

Run into the crumb of a loaf, one day old, the blade of a knife considerably heated; and if adulterated with alum, it will shew its unwholesome adherences on the surface: and it may be further detected by the smell. Bone-dust or plaister of Paris may be discovered, by slicing the soft part of a loaf thin, and soaking it in a large quantity of water in an earthen vessel, placed over a slow fire, three or four hours. Then having poured off the water and pap, the obnoxious matter will be found at the bottom.

To preserve houses from vermin.

Bugs, in particular, may readily be destroyed by dissolving half a drachm of corrosive sublimate, in a quarter of an ounce of spirit of salts, mixing it with one quart of spirit of turpentine. Shake these well together, dip a brush in it, and wash those places where bugs are supposed to resort; this will remove them to a greater certainty than any other mode now practised.

MANAGEMENT OF BEES.

To work bees in glass hives.

To produce the finest virgin honey, without the cruel practice of destroying the bees, and having the opportunity of seeing them at their labours, a double-topped straw hive has been invented by Mr. John Molton, at 175, Strand, and is so constructed as to support four glasses; which may be removed with safety, and the bees kept warmer and more secure than in any other hives.

Hive a swarm in the lower part of the hive in the usual way. The board at the top must be kept close by taking care to secure the openings: this is done by turning the top board by means of a thumb screw, so that when first hived, the holes of both boards shall not correspond, and by thus turning the upper board, it will prevent the bees from passing through, while hiving. At night, bring the hive into the bee house, or where it is intended to stand; in about two days after place on the glasses, (which should be clean) over their respective openings, and stop them round with mortar: after which turn the board to admit the bees to ascend for the purpose of working, cover the glasses with the small upper hive, and do not look at them for a few days. Indeed, nothing will then be necessary, but to ascertain when they are filled, which is known by the cell being sealed over, which may be expected in about 20 days after a swarm has been hived.

When the honey is to be taken, and all the glasses removed, it will be requisite first to turn the board to exclude the bees; then with a thin knife loosen them from the adapter, leave them thus for about an hour; then carry the glasses inverted a short distance from the hive into the shade; or raise the glasses with a small wedge, and what few bees remain will readily leave and return to their original hive. This, if effected early in the season, will afford the opportunity of immediately replacing the same, or another set of glasses to be again filled.

Observe, if wanted at any time, to take only one or two of the glasses with honey, do not turn the board; as by so doing the combs are disunited, and the bees themselves will then empty the remaining glasses (although afterwards re-fill them—which might occasion a loss of time in the best part of the season for working:) to simplify which only loosen such glasses as are wished to be removed, with a thin knife, set them on a divider, and replace others in their stead. The middle of a fine day is the best time to remove glasses.

It will not be advisable to take any honey from the hive after the end of July, as the remaining part of the season might not prove favourable to their gathering enough for their winter's support; therefore, it will be necessary, about this time, or early in August, to remove all the glasses and turn the board, to finally shut them up.

Those glasses, only partly filled with combs should be carefully set aside to be placed on again the following April; if, however, the stock will require feeding, leave one or more of the glasses with honey for that purpose, which is by far the best mode.

Thus much for the swarm which is left till the following April—the time to commence again working the glasses, as hives are now full of combs and brood, should the season prove favourable, work the glasses twice or more, and equal success will attend every subsequent corresponding year, but the first season a swarm cannot be expected to fill the glasses more than once, which will produce 8 pounds of the finest honey.—This method of management will not prevent the bees from swarming.

The honey thus obtained, being fresh from the hive, will be of the finest quality, pure, perfectly free from the young brood, of remarkably fine fragrance, clear in colour, and very far superior to any produced from common hives; it may also be taken at pleasure without injury to the bees—especially, without being obliged to resort at any time to the painful and execrable process of smothering these industrious and valuable insects.

To work bees in straw hives.

The double cottage straw hive will answer many purposes in the keeping of bees, as either a glass or a small straw hive may be worked on the top of it, which gives it an advantage over the common hive, although the method of management is simple, and the price easy.

Prepare this hive for a swarm by spreading mortar round the crown of it, to carry the adapter to support a glass, or small straw hive, as it may be worked with either. Hive the swarm as usual, taking care to secure the opening at the top; after removing it to its appointed place, let the swarm work for ten days; then clear the opening at top, and affix on either a glass or a small straw hive—the bees will then ascend for working. Stop the upper hive round with mortar to the adapter, and darken it with a common hive; in the course of from fifteen to twenty days examine it, and if full, take the honey as here directed; —pass a knife or wire between the adapter and small hive to separate the combs; after which remove the small hive of honey on a divider; (a brass plate about 12 inches square) it will then be immediately necessary to place a small hive on the adapter, or stop the opening till another hive is to be worked. Carry the small hive now on the divider a short distance away, or rather into a darkened room;

invert it, and place over it a small empty hive of the same size; keep them steady, and, by tapping round the bottom hive, the bees, in a few minutes, will ascend to the hive above; carry them to within about two yards of the original stock, shake them out, and they will enter again as usual.

To work bees in a box hive.

This elegant box hive consists of three divisions and so ingeniously constructed, that the finest honey may be taken without destroying the bees; work a glass hive on the top, and inspect the whole of their curious and interesting labours without disturbing them.

When a swarm is placed in this hive, shut the slider of the adapter, tie a small cord round to secure the parts; hive the swarm in the usual manner; at night bring it into the bee-house or place appointed, open the entrance at bottom and remove the cord; if a glass hive is worked on the top place it on the same evening, stop it round, then draw back the slider to clear the grate, leave it a few minutes, and the bees will ascend for working. Then raise the two upper divisions to be able to remove the bottom division, and by the compression the bees are obliged to work in the glass hive, which should be darkened with its proper cover, and left for a few days without being looked at; it will be necessary to replace the unemployed division at the bottom four or five days previous to the removal of the glass of honey: in removing which shut the slider and leave it in this state for one hour: then follow those plain directions laid down for the removal of glass hives.

If more honey is wanted from this hive than the glass affords, examine the divisions early in September; if the three are full, viz. the 2 upper hives of honey and the bottom of combs; and not otherwise, proceed to remove the fillets of the top division, and pass the brass divider between those parts, where it should remain for an hour; then raise the division with a wedge, and draw back the slider of the adapter to let the bees out, and when clear, which will be in a few minutes, remove this division and place the adapter to the next division, and by withdrawing the divider it will fit close down; when the combs of honey are taken out from this division, it should be replaced at the bottom; consequently, every year, or once in two years, give them as it were a fresh division, or part of a hive to rebuild in, which keeps the bees constantly at work, and the combs in a good state of preservation.

To work bees in a hexagon box hive and straw hive.

This box hive is admirably constructed with slider and grating, having large glass windows, and supporting a glass hive on the top, that, when well supplied with bees, it affords the pleasing opportunity of viewing the progress of their labours, and exhibits a very interesting and beautiful appearance.

To hive a swarm, it is only necessary to shut the slider over the grating, and then proceed as before directed. (When a glass hive is to be worked, follow the instructions given with the superior box hive.) This hive is the best calculated to work bees from other hives, especially when they are in a state of decay, particularly the common hive—it is effected merely by withdrawing the slider clear off the grate, and placing the common hive over it in the evening, taking care to stop the entrance of the former with mortar. The bees will of course then enter at bottom, and when they have worked the bottom hive nearly full, which is ascertained by means of the windows, carefully lift them up, and place under them another hexagon hive; consequently, this colony consists of three hives, and it will not be safe to remove the upper hive, unless the bees have worked combs into the bottom hive, which, if effected at the end of the season, the common hive may be safely taken with its contents.

To work bees in the common hive.

This hive being in such general use in this country for many years, requires but little observation, except on some essential points, which, to benefit the cultivator, ought to be attended to. First, care should be taken to have the hive made of clean and good straw, and manufactured of a suitable thickness. Some hives are so thin and loose, as to require many days of the most valuable time of the swarm to render the hive fit for their use.

Secondly, a hive should be chosen in proportion to the size of the swarm; and when a good hive is obtained, and a swarm placed in it, which should fill it to within a rim or two of the bottom, shelter it from cold winds and rain; for if once the wet penetrates a hive, it affects the combs, and the bees, getting a distaste for their home, will work very slowly, and often desert it altogether; whereas, if they have a hive to their liking leave them unmolested, and they will soon furnish it with combs and honey. It is not material in what aspect the stock stands, provided the sun shines on the hive once in the course of the day. Well peopled hives, kept dry, will thrive in most situations.

One of those fatal accidents to which this hive is subject, occurs through covering it with a hackle or turf, by which their great enemy the mouse is enticed, who will make a nest on the top, and ultimately eat its way through the crown of the hive, and destroy both combs and bees.

About August the robbing commences by bees and wasps, which is but little regarded; and important benefit will be derived by destroying the queen wasp seen about April, which is the mother of thousands; much therefore depends on the preservation of those hives which are to stand the winter. To protect them, apply the guard invented by Mr. Espinasse, which is calculated to prove highly beneficial in its effect.

In September, attention should be directed to weigh the stocks; none of those of less than from 15 to 20 pounds in weight can safely be relied on to stand the winter, without feeding; and stop all hives down to the board with mortar.

To establish an apiary.

The best time to establish an apiary is about February, as the stocks have passed through the winter in safety—the combs are then empty of brood, light of honey, and the removal safe and easy. Stocks should be selected by a competent judge, as the weight alone cannot always be relied on; but such as weigh 12 lbs. and upwards—the number of bees must also be observed, and that they are well combed to near the bottom—these may be safely chosen.

When they are brought home, set them in the bee-house, being particularly careful to keep them dry. The next day, plaister the hive to the board, leaving an entrance the size of the little finger.

If this season has passed, purchase the first and early swarms; for late ones or casts are not worth keeping, unless two or three have been united.

To remove stocks, the evening is the best time; the hive should be raised by wedges some hours previous, unless the floor be also moveable with the hive—otherwise, many bees will remain on the floor at the time, and prove very troublesome. But when the floor is moveable, plaister the hive with mortar to the board; pin a card pierced with holes before the entrance, securing the hive to the board firmly; in this way it would travel any distance.

Swarms purchased should be brought home the same evening; for if delayed for a day or two, combs will be worked, and subject to be broken in removing.

To cultivate bee-flowers.

Bees are most fond of those places where their favourite flowers are to be found; therefore bee-keepers should encourage the growth of such shrubs and flowers as are known to supply honey and wax in the greatest abundance; in most situations bees do not fly far for food, generally not more than half a mile; they may be observed to return with great precipitation to the hive when rain or a storm approaches. The following are the most favourable for pasturage, and those which blossom early are the most desirable:

Shrubs, &c.	*Flowers.*	
Sallow, or the grey willow.	Mignonette.	
Rosemary.	Lemon thyme.	
Barberry-tree.	Garden and wild thyme.	
Gooseberry.	Borage.	
Raspberry.	Winter savory.	
Apricot and all other fruit-trees.	Hyssop.	
Lime-trees.	Mustard.	when left for seed.
Furze.	Turnips.	
Broom.	Cabbage.	
Heath.	White clover.	
	Scarlet and other beans when in bloom.	

Mignonette, borage, and lemon thyme are the principal, as they continue very long in bloom, and afford the finest honey. Rosemary is also a great favourite, but seldom supplies much honey in this country, unless the weather proves very hot, and dry when it is in blossom, yet it is worth cultivating, especially in a southern aspect, being one of the principal aromatic plants from which the bees in the neighbourhood of Narbonne collect their honey, which is esteemed the finest in Europe. Fields of beans, white clover, and buck wheat, are of great benefit. Rivers or streams of water are also very beneficial, as bees make use of a great deal of water.

To swarm bees.

Swarming depends on the increase of bees, and a queen being ready to lead them. Their breeding begins sooner or later according to the forwardness of the spring, the fruitfulness of the queen, and the populousness of the hive. When bees carry in farina or pellets on their thighs, it denotes they have commenced breeding, which may be as early as February, and not finish till October; and when their numbers are much increased they show indications of swarming, by their clustering in great quantities below the resting board. They never rise but on a fine day, and sometimes will settle, and for some cause return to the stock, probably for want of a queen being with them. Some hives will cast three times, but mostly only twice. The second cast may be expected within three or four days, and never later than ten days after the first. Should a stock overswarm itself it will perish, unless strengthened; this may be ascertained by observing the quantity of bees afterwards seen to enter. It is necessary in the swarming season from April to July, particularly in May and June, to observe the hives on a fine day; in general the bees issue forth about noon—from 9 to 2 o'clock, or about 3 in the afternoon.

To hive bees.

Bee keepers should have spare hives by them, prepared to hive the bees as soon as they are settled: for should the sun shine hot on the swarm it may take another flight and may possibly be lost entirely. The manner of hiving them must be regulated by the nature of the place on which they settle. The custom of preparing hives varies; a clean new hive only requires the loose straw to be rubbed off with a cloth: if any dressing be used, fennel dipped in ale and sugar will best answer the purpose. Have ready a cloth whereon to place the hive, and a wedge to raise it: if the swarm should settle on a branch, shake the best part of it into the hive, place it on the cloth on the ground, and continue to disturb the swarm where it settled, and the hive being left underneath, they will all go in; or cut the branch off, and gently place it in the hive. Should the bees settle on the ground, place the hive over them; and though bees are not apt to sting at this time, the hiving should be performed quietly. Avoid talking and breathing on them, and if any of them are crushed, they will resent it; therefore, to prevent accident, invariably use the bee-dress, which will give confidence. All swarms are to be sheltered and left near to where they settle till the evening; thence to be removed very gently to the appointed place.

To unite swarms, and reinforce stocks.

It is essential when there are weak swarms of bees, that they should be strengthened. The idea, so prevalent, of the greatest number of hives producing the most honey and wax, is erroneous; for great part of the bees are necessarily employed in rearing the young, and therefore the number of those who are occupied in collecting honey is not near so great as has been imagined; for every swarm, the least as well as the greatest, is provided with a queen, equal in fecundity to the queen of the larger stock, and as the brood she brings continually demands the labour and attendance of nearly half the bees, this circumstance renders the other moiety, from the smallness of their number, unable to accumulate a large quantity of honey in the short time it mostly abounds, and therefore honey cannot be obtained in glass hives or otherwise, but from a strongly-peopled hive.

Hive the swarms or casts in the usual way, and at about 8 o'clock the same evening spread a cloth on the ground, near to the hive required to be reinforced; bring the new swarm, and strike it down rather hard, flat on the ground. The bees will then fall in a cluster; quickly place over them the stock to be reinforced; in ten minutes they will have united and become as one family, to be removed the same evening to its former situation.

Or, each cast or swarm may be hived separately. In the evening, turn the crown of the hive into a pail, and set the other hive exactly over it; in the morning, the bees from the bottom hive will have ascended.

The system of uniting, so very important, is but little practised, and has been overlooked by many cultivators; but it is absolutely necessary to have the hives well peopled and completely sheltered from wet, which are the principal and main objects to be particularly attended to in the art of bee keeping; and the advantages of uniting swarms will be found particularly beneficial in working the glasses with the newly invented double-topped hives.

To feed bees.

With the aid of feeding it is perfectly easy to bring any hive of bees through the winter; but to ensure the success of a very light stock, it is essential to keep it also very warm and dry. Feeding is absolutely necessary when more honey has been taken than the hive can afford, by means of small hives or glasses. Such stocks as are intended to be kept through the winter should weigh twenty pounds or upwards, at the end of September; but casts and late swarms seldom attain this weight, unless two or more should have been united. The composition for feeding consists of moist sugar and new beer, the proportion of one pound of sugar to a pint of beer, simmered to the consistency of treacle: to be inserted into the hives, by means of small troughs, at night, and removed the next morning early. Should a hive be very poor and weak it is better to feed in larger quantities each time.

Another method.

Have a thick wooden hoop about six inches deep, to set upon the board when the hive is taken up, and set honeycombs, with the natural honey in them, or filled with sugar a little moistened, and set the hive upon it. A piece of an old hive will make a good hoop. Old empty combs should be carefully kept covered up with a piece of thin linen or muslin in a very clean place for feeding the bees. Weak hives should be removed at a distance from the rest, when they must be fed; if near, the strong will rob them. Remove them in the following manner. Take up the board with the hive, tie a cloth firm over it, and with a hand-barrow, carry it gently between two where it is intended to be placed. Troughs of pithy wood, filled with moistened sugar or honey, and thrust in at the aperture of the hive, is a good method of feeding. Be sure when raising a hive from the board, to fix it down again with plaister lime.

Be not hasty in concluding a hive is dead though the bees seem inactive. Expose them at mid-day, turned upon a white sheet, where the sun is most powerful, for half an hour; then house them in a warm place, where neither noise, bad smells, nor light can annoy them.

If wanted to purchase a hive, defer it till May. Set careful persons to watch at several stalls that they may reckon, by watch time, every loaded bee that comes in for 10 or 15 minutes. That which has most labourers should be the choice. All the refuse honey, after draining the best in jars, should be kept in a clean place for feeding the bees.

Improved machine for feeding bees.

Prepare a board a little larger than the bottom of the hive, in the centre of which make an opening about 10 inches diameter; then form a frame of half inch deal, to consist of four sides, each about twelve inches by three inches; make the angles firm with small wooden blocks, to which affix the before-mentioned board. A door should then be made in a side of the frame, sufficiently large to admit a deep plate, or small dish, to contain the food. By the use of this machine, the bees are fed quietly, and protected from the cold weather and the intrusion of other bees. It is scarcely necessary to observe further, that the door of the machine should face such part of the bee-house as best suits convenience. The dish of food to be placed under should be covered with a piece of thick paper the size of the plate or dish, pierced in holes, through which the bees will feed; and a quantity of short pieces of straw also put into the dish will prevent the bees from daubing themselves. They should be fed at night, and the dish only taken away early on the following morning; to do this, the face and hands should be covered. The autumn and early part of the spring are times proper to examine if any hives require feeding; but always commence before the stock is in absolute want of food, otherwise the bees will be so poor and weak as to be unable to come down.

To manage honey.

To judge of the best honey, it should be of a bright pale colour, thick, and a little aromatic. To obtain it from the combs in its pure state, it must be left to run from them without pressing. The colour shows whether it is fine or inferior. If wanted to press some in the comb, choose the fairest and such as have not been broken: wrap each comb in white paper, such as lines the blue cover of loaf sugar. Set it edgeways as it stood in the hive, and it may be preserved many months. The combs meant to be drained, must be cut in slices. Lay them on a hair-search, supported by a rack over the jar, in which the honey is to remain; for the less it is stirred after draining, it keeps the better. Fill the jar to the brim, as a little scum must be taken off when it has settled. A bladder well washed in lukewarm water, ought to be laid over the double fold of white paper with which it is covered.

To take the honey without destroying the bees.

The following easy method of taking the honey without destroying the bees, is generally practised in France. In the dusk of the evening, when the bees are quietly lodged, approach the hive, and turn it gently over. Having steadily placed it in a small pit, previously dug to receive it, with its bottom upwards, cover it with a clean new hive, which has been properly prepared, with a few sticks across the inside of it, and rubbed with aromatic herbs. Having carefully adjusted the mouth of each hive to the other, so that no aperture remains between them, take a small stick, and beat gently round the sides of the lower hive for about ten minutes, or a quarter of an hour, in which time the bees will leave their cells in the lower hive, ascend, and adhere to the upper one. Then gently lift the new hive, with all its little tenants, and place it on the stand from which the other hive was taken. This should be done some time in the week preceding midsummer day, that the bees may have time, before the summer flowers are faded, to lay in a new stock of honey, which they will not fail to do for their subsistence through winter.

To manage bees generally.

The best situation for bees is to the north, with a range of hills wooded on the summit, and toward the base, enriched with heather, skirted to the east with a stream from the rocks. To confine this rivulet, the bee-master should sow the sandy beach with the seed of furze, and cover it with a light surface of earth. The furze would soon vegetate; and blooming, in the course of three years, overpay his labour, by providing the bees with pasture on soil otherwise barren, and the margin of the brook would gradually rise to restrain its encroachment on fertile lands. Suppose a white clover field to the south of the hills, and south from the field a large garden, where hardy winter greens have been allowed to flower, as early food for the bees. White mustard should also be sown very early in patches near the hive; but not nearer than one yard. A few dwarf flowers may come within two feet, but tall grown ones would assist insects to get up. To the west, it would be desirable to have a shrubbery, a wood, a broomy common, or heather moor.

The stations for the hives must be six yards asunder, and never nearer than three yards. The board on which they are placed ought to be of one piece; or if joined, the under side of the joining should be lined with a thinner board fixed closely with wooden pins. The edges of this rounded standard should project four inches all round from the hive. Place it on three wooden pillars sixteen inches long, ten inches above the ground, but six inches of its length should be firmly thrust into the earth, in all its length to be sixteen inches. The pillar in front should be an inch shorter than the other two, and the three pillars should be within twelve or fourteen inches of the outer edge of the board, to exclude rats and mice. For the same reason no tall-growing plant, no wall, nor any means for ascent should be within three or four feet of the hive. In fine weather, the entrance to the hive must be four inches long, and an inch and a half in depth.

In the beginning of the fine season, when the bees can get food, or have stores remaining, the bee-master has nothing to do but to keep the ground about the hives clear from weeds, and from whatever might enable vermin to climb there. Yet as a thriving stock inclines very soon to swarm, the hives must be frequently looked after, from eight in the morning till five in the afternoon. The symptoms are generally thus: The little city seems crowded with inhabitants.—They are continually in motion during the day; and after working time, they make loud noises. The drones may be seen flying about in the heat of the day, and the working bees go with a reeling motion and busy hum. When the bees come regularly out of the hives, let no noise, no interruption incommode them: but if they fly long, as if they were unsettled, some tinkling noise or the loud report of a gun, will make the fugitives repair to the nearest lodgings. If there is an empty hive with combs and some honey in it, they will readily go there. If a new hive is used, remember to smooth it well within, and singe off loose straws. Perpendicular sticks should never be employed. Four cross sticks at equal distances will support the combs. Old hives do very well for late swarms that are not to be preserved through the winter; but box hives are best for them, as the bees work fastest there. They are not, however, fit for being kept through the cold seasons.

It is to be observed that great haste in forcing a swarm into the hive may disperse them. Give them time to settle undisturbed, though keep a steady eye on their motions: but whenever they gather into a cluster, lose no time in placing the hive over them. If the swarm rest on any thing that can be brought to the ground, spread a clean linen cloth: lay two sticks on it, two feet asunder; lay the body on which the swarm have fixed, gently on the sticks; covering it with the hive by a motion the least perceptible; and taking care that the edges of the hive rests upon the sticks. Cover hive and all with a cloth; for the sun might allure the bees to rise again. When they have gone into the hive, cover it with its own board, and carry it cautiously to its station. Bees are apt to leave their hive even after they begin to work, so they must be watched till evening, and throughout the ensuing day. Whenever they are sure to remain, fix the hive to its board with a little lime round the edges; and crown it with green sods to keep out too great heat or rain.

If a hive divides into two swarms, it is a sign that each swarm has a queen. Put each into old hives or boxes; but they must be kept separate. If a cluster of bees about the size of a small plum, are seen together, the queen will generally be found there. Separate them, and with a drinking glass turned down, you may seize the queen. Put her, and a score or two of her subjects into a box full of holes, large enough to admit air, and yet not to allow the bees to escape. Feed her with honey combs, and keep her in reserve in case of the death of a queen in one of the hives. When a hive ceases to work, it is a sure sign the queen is no more. Then the bee-master may wait an hour and not see a loaded bee enter the habitation. But if the spare queen be taken late in the evening, wetting her wings to prevent her escape, and introduce her to the desponding society, they will receive her gladly, and begin to work.

If a hive fights among themselves, be assured there are two queens: and they will destroy each other, if one is not taken away to keep.

When bees are to swarm a second, or more times, they do not come out in clusters: but they make a sound called bellings, which may be heard; ceasing for a little, and renewed again and again. If there are different tones, it is certain there are several young queens in the hive. It is only by putting the ear close to it, that the sound can be heard distinctly.

To keep large hives for winter.

They must not be more than three years old, and well stocked with bees. A hive for preserving should weigh from thirty to forty pounds. Place them in October where they are to remain, observing the usual precautions against vermin, or winds; and giving them if possible a distance of six or eight yeards asunder, that they may not rob each other. Set the hive after sun-set. Plaister the edges firmly round with plaister lime, all except the entrance. Fit a piece of hard wood to the aperture; cut two holes a quarter of an inch square, and fix the board as a door with plaister lime. Cover the hive with drawn straw tied together at the top; and fix it with straw ropes round. Cut the straw a quarter of an inch below the board, for a few lengths may conduct vermin into the torpid community. Once in four or five weeks raise the hive from the board after sun-set. Scrape the board clean, and brush away dead bees. Observe when turning them up if they move their wings; if not, bring them into a warmer situation, free from noise, and the light excluded. Keep them there till the extreme rigour of the season is past, and then return them to their old situation after sun-set.

Sunshine in snow is destructive to bees if they get out. Put a platting of twigs across the holes to give air, and yet confine the inmates. Never confine them more than eight or ten days, and except in snow in the sunshine, their own sagacity will direct when it is safe to go out. It is absolutely necessary for their health, to have leave for going in and out in tolerably mild weather.

To manage bee-hives of Mr. Thorley's construction.

The bottom part is an octangular bee box, made of deal boards, about an inch in thickness, the cover of which is externally 17 inches in diameter, but internally only 15 inches, and its height 10. In the middle of the cover of this octangular box is a hole, which may be opened or shut at pleasure by means of a slider. In one of the pannels is a pane of glass, covered with a wooden door. The entrance at the bottom of the box is about three and a half inches broad, and half an inch high. Two slips of deal, about half an inch square cross each other in the centre of the box, and are fastened to the pannel by means of small screws: to these slips the bees fasten their combs. In this octangular box, the bees are hived, after swarming in the usual manner, and then suffered to continue till they have built their combs, and filled them with honey; which may be known by opening the door, and viewing their works through the glass pane, or by the weight of the hive. When the bee-master finds his laborious insects have filled their habitation, he is to place a common bee-hive of straw, made either flat on the top, or in the common form, on the octangular box, and drawing out the slider, a communication will be opened between the box and the straw hive; in consequence of which the bees will fill this hive also with the product of their labours.

When the straw hive is well filled, the slider may be pushed in, and the hive taken away, and another placed in its room, with the slider drawn out. This new hive will also be filled in the same manner.

Mr. Thorley assured the Society of Arts, that he had taken three successive hives, filled with honey and wax, from a single hive during the same summer; and that the food still remaining in the octangular box, was sufficient for the support of the bees during the winter. He says, that if this method was pursued in every part of the kingdom, instead of the cruel method of destroying these useful insects, he is persuaded, from long experience, that wax would be collected in such plenty, that candles made with it might be sold as cheap as those of tallow are sold at present.

Mr. Thorley has also added another part to his bee-hive, consisting of a glass reservoir, 18 inches high, 8 inches in diameter at the bottom, and in the greatest part 13; this receiver has a hole at the top, about one inch in diameter, through which a square piece of deal is extended nearly to the bottom of the vessel, having two cross bars, to which the bees fasten their combs. Into the other end of this square piece is screwed a piece of brass, which serves as a handle to the receiver or glass hive. When the bees have filled their straw hive, which must have a hole in the centre, covered with a piece of tin, Mr. Thorley places the glass receiver upon the top of the straw hive, and draws out the piece of tin. The bees now finding their habitation enlarged, pursue their labours with such alacrity, that they fill their glass hive likewise with their stores, the whole progress of their works. It will, however, be necessary to cover the glass with an empty hive of straw, or at least with a cloth, lest too much light prevent their working. In this way Mr. Thorley, in a good season, has had a glass hive filled in thirty days, containing 38 pounds of fine honey. When the glass is completely filled, slide a tin plate between the hive or box, so as to cover the passage, and in half an hour the glass may be taken away with safety. The few bees that remain will readily go to their companions.

Mr. Thorley has added a glass window to his straw hives, in order to observe the progress of the bees; and this contrivance is useful, especially if one hive is to be removed whilst the season continues favourable for their collecting of honey: for, when the combs are filled with honey, the cells are sealed up, and the bees forsake them, and reside mostly in the hives in which their works are chiefly carried on. Observing also, that the bees were apt to extend their combs through the passage of communication into the upper hive, which rendered it necessary to divide the comb, when the upper hive was taken away, he puts in that passage a wire screen for netting, the meshes of which are large enough for a loaded bee to pass easily through them; and thus he prevents the junction of the combs from one box to the other, and consequently obviates the necessity of cutting them, and of spilling some honey, which running down among a crowd of bees, incommoded them much.

To manage bees on Mr. Cobbett's plan.

The best hives are those made of clean, unblighted rye-straw. A swarm should always be put into a new hive, and the sticks should be new that are put into the hive for the bees to work on; for, if the hive be old, it is not so wholesome; and a thousand to one that it contains the embryons of moths and other insects injurious to bees. Over the hive itself there should be a cap of thatch, made also of clean rye-straw; and it should not only be new when first put on the hive, but a new one should be made to supply the place of the former one every three or four months; for, when the straw begins to get rotten, as it soon does, insects breed in it, its smell is bad, and its effect on the bees is dangerous.

The hives should be placed on a bench, the legs of which, mice and rats cannot creep up. Tin round the legs is best. But even this will not keep down ants, which are mortal enemies of bees. To keep these away, if they infest the hive, take a green stick and twist it round in the shape of a ring, to lay on the ground, round the leg of the bench, and at a few inches from it; and cover this stick with tar. This will keep away the ants.

Besides the hive and its cap, there should be a sort of shed, with top, back, and ends, to give additional protection in winter: though, in summer, hives may be kept too hot, and in that case, the bees become sickly, and the produce light. The situation of the hive is to face the south-east; or, at any rate, to be sheltered from the north and the west. From the north always, and from the west in winter. If it be a very dry season in summer, it contributes greatly to the success of the bees, to place clear water near their home, in a thing that they can conveniently drink out of; for, if they have to go a great way for drink, they have not much time for work.

It is supposed, that bees live only a year; at any rate, it is best never to keep the same stall, or family, over two years, except it be wanted to increase the number of hives. The swarm of this summer should always be taken in the autumn of the next year. It is whimsical to save the bees when the honey is taken. They must be fed; and, if saved, they will die of old age before the next fall; and though young ones will supply the place of the dead, this is nothing like a good swarm put up during the summer.

A good stall of bees, that is to say, the produce of one, is always worth about two bushels of good wheat. The cost is nothing to the labourer. He must be a stupid coutryman indeed, who cannot make a bee-hive; and a lazy one indeed, if he will not if he can. In short, there is nothing but care demanded; and there are very few situations in the country, especially in the south of England, where a labouring man may not have half a dozen stalls of bees to take every year. The main things are to keep away insects, mice, and birds, and especially a little bird, called the bee-bird; and to keep all clean and fresh as to the hives and coverings. Never put a swarm into an old hive. If wasps, or hornets, annoy you, watch them home in the day time; and, in the night, kill them by fire, or by boiling water. Fowls should not go where bees are, for they eat them.

POTTERY.

To manufacture English stone ware.

TOBACCO-PIPE clay from Dorsetshire, is beaten much in water: by this process, the finer parts of the clay remain suspended in the water, while the coarser sand and other impurities fall to the bottom. The thick liquid consisting of water and the finer parts of the clay, is further purified by passing it through hair and lawn sieves of different degrees of fineness. After this, the liquor is mixed (in various proportions for various ware) with another liquor of the same density, and consisting of flints calcined, ground, and suspended in water. The mixture is then dried in a kiln; and being afterwards beaten to a proper temper, it becomes fit for being formed at the wheel into dishes, plates, bowls, &c. When this ware is to be put into the furnace to be baked, the several pieces of it are placed in the cases made of clay, called seggars, which are piled one upon another, in the dome of the furnace: a fire is then lighted; when the ware is brought to a proper temper which happens in about 48 hours, it is glazed by common salt. The salt is thrown into the furnace, through holes in the upper part of it, by the heat of which it is instantly converted into a thick vapour; which, circulating through the furnace, enters the seggar through holes made in its side (the top being covered to prevent the salt from falling on the ware,) and attaching itself to the surface of the ware, it forms that vitreous coat upon the surface which is called its glaze.

To make yellow or queen's ware.

This is made of the same material as the flint ware; but the proportion in which the materials are mixed is not the same, nor is the ware glazed in the same way. The flint ware is generally made of 4 measures of liquid flint, and 18 of liquid clay; the yellow ware has a greater proportion of clay in it; in some manufactories they mix 20, and in others 24 measures of clay with 4 of flint. The proportion for both sorts of ware depends very much upon the nature of the clay, which is very variable even in the same pit. Hence a previous trial must be made of the quality of the clay, by burning a kiln of the ware. If there be too much flint mixed with the clay, the ware, when exposed to the air after burning, is apt to crack; and if there be too little, the ware will not receive the proper glaze from the circulation of the salt vapour.

To manufacture English porcelain.

The iron-stone, which contains a portion of argil and silex, is first roasted in a common biscuit kiln, to facilitate its trituration, and to expel sulphur and other volatile ingredients which it may contain. A large earthen crucible is constructed after the exact model of an iron forge, a part of the bottom of which is filled with charcoal or cokes: these having been previously strewed with ore, and about one-third part of lime, are raised to an intense heat by a strong blast of air, introduced under the cokes at the bottom. By this heat the ore is fused, and the fluid iron drops through the fuel to the bottom: then follows the scoria, which floats upon the top of the fluid iron. This latter scoria, or, as the workmen call it, slag, is the material used in the manufacture of the china, and is much impregnated with iron, and of a compact and dense structure. The slag is next let off, by a hole through the forge, into a clean earthen vessel, where it cools. This last vessel is then broken, in order to detach the slag from it, with hammers. The scoria is next pounded into small pieces and ground in water, to the consistenee of a fine paste, at the flint mills of the country. This paste is then evaporated to dryness, on a slip kiln, well known among potters. Thus evaporated to dryness it is used with the other ingredients in the following proportions, viz.

Prepared iron stone, 3 cwt.—ground flint, 4 cwt.—ground Cornwall stone, 4 cwt.—Cornwall clay, 4 cwt.—blue oxide of cobalt, 1 pound.

These having been mixed together with water by the slip-maker, are again evaporated on the slip kiln to the proper consistency for use. The clay, thus prepared, is of course used in the usual manner in the fabrication of the several kinds of vessels.

Black glazing.

Take 8 parts of red lead, 3 parts of iron filings, 3 parts of calcined copper, and 2 parts of zaffre. This, when fused, will produce a brown black; but if wanted a truer black colour, the proportion of zaffre must be increased.

To make porcelain or china.

Porcelain, or china, is a semi-vitrified earthen ware, of an intermediate nature between common ware and glass. Chinese porcelain is composed of two ingredients, one of which is a hard stone, called petunse, which is carefully ground to a very fine powder; and the other, called kaolin, is a white earthy substance, which is intimately mixed with the ground stone. The former is of the silicious, and the latter of the aluminous genus.

Several compositions of mingled earths may yield a true porcelain, by being burnt; and the porcelains of various countries differ in their mixtures. But the principal basis of any true porcelain is that kind of clay which becomes white by baking, and which, either, by intermingled heterogeneous earth, or by particular additions, undergoes in the fire an incipient vitrification, in which the true nature of porcelain consists. Feldspar and gypsum, if added, may give that property to infusable clay.

When porcelain is to be made, the clay is properly selected, carefully washed from impurities, and again dried. It is then finely sifted, and most accurately mingled with quartz, ground very fine; to which, then, is added some burnt and finely pulverized gypsum. This mass is worked with water to a paste, and duly kneaded; it is usually suffered to lie in this state for years. The vessels and other goods formed of this mass are first moderately burnt in earthen pots, to receive a certain degree of compactness, and to be ready for glazing. The glazing consists of an easily melted mixture of some species of earths, as the pestrosilex or chert, fragments of porcelain and gypsum, which, when fused together, produce a crystalline, or vitreous mass, which, after cooling, is very finely ground, and suspended in a sufficient quantity of water. Into this fluid the rough ware is dipped, by which the glazing matter is deposited uniformly on every part of its surface. After drying, each article is thoroughly baked or burned in the violent heat of the porcelain furnace. It is usual to decorate porcelain by paintings, for which purpose, enamels or pastes, coloured by metallic oxides, are used, so easy of fusion as to run in a heat less intense than that in which the glazing of the ware melts.

To make delft-ware.

This is a kind of pottery made of sand and clay, and but slightly baked, so that it resists sudden applications of heat. Articles made of this are glazed with an enamel, composed of common salt, sand ground fine, oxyde of lead, and oxyde of tin. The use of the latter is to give opacity to the glaze.

To make china ware.

The composition of the eastern or proper china-ware, according to accounts that have great marks of authenticity, is from two earths; one of which is, as was before mentioned, vitrescent, and is called petunse; the other a refractory, or a pyrous earth and called kaolin.

The preparations of the petunse, or aluminous earth, is by pounding the stone till it is reduced to a very fine powder, and then washing it over to bring it to the most impalpable state, which is thus performed: after the stone is rendered as fine as it can be by pounding or grinding, the powder must be put into a large tub full of water, and, being stirred about, the upper part of the water must be laded out into another tub, by which means the finest particles of the powder will be carried into it. The water in the second tub must be then suffered to stand at rest till the powder is subsided, and as much as can be laded off clear must be put back into the first tub, and there being again stirred about, and loaded with a fresh quantity of the most subtle part of the powder, must be laded again into the second tub as before, and this must be repeated till none be left in the first tub but the grosser part of the stone; which, not being of a due fineness, must be again pounded, and treated as at first. The fine powder obtained in the second tub, must then be freed from the water, by lading off the clear part and suffering what remains to exhale, till the matter become of the consistence of soft clay, when it will be fit to be commixt with the kaolin for use.

The kaolin, or mica, is prepared in the same manner by washing over, but some specimens are so fine, that there is no occasion for this or any other purification.

From these two mixt together, the clay or paste is formed; but it is said, that the proportion of the respective quantities is made to vary according to the intended goodness of the ware, the best being made from equal quantities, and the worst from two of the kaolin to one of the petunse.

To make Saxon or Dresden china.

The Saxon composition, of which the china-ware is formed, is greatly similar to that of the eastern. In the place of the petunse, a stone is used, which is improperly called in the German language, bleyspatt, or spar of lead. It is a stone of a very contrary nature, as spars are calcareous, and will, on calcining, become lime; on the other hand, this stone is of a vitreous nature, though it is said no fire will fuse it without some mixture. This spar is of a very hard texture, and of a light flesh colour, or pale whitish red. It is prepared by pounding and washing over, which may be done as above-directed, and it is then ready for compounding with the mica. The mica is employed in the Saxon composition for the other ingredients, and is likewise prepared by grinding and washing over, when it is not in a perfect and pure state, but when it is entirely clean, it may be tempted with the texture, thoroughly broken, and it will be of the consistence of soft clay.

The two kinds of earth being prepared in the state of a soft paste, they are to be incorporated and blended into one mass, which is done by rolling and stirring them well after they are in the same vessel, and then kneading them with the feet, till they are thoroughly united. When the compound mass is formed, it is made into cakes, or square pieces, and put by layers into cases of wood or stone, which must be placed in a moist situation, and left for two or three months; during which time a kind of putrid ferment enters into the mixture, by which the parts of the different matter combine and form a substance with new qualities unknown while separate. This change shews itself upon the whole mass by a fetid smell, and a greenish or blueish colour, and a tenacity like that of clay, or the argillaceous moistened earths. If the time of keeping the paste in this condition be prolonged to a year or more, it will further improve its qualities, but great care must be taken to prevent its becoming dry: to prevent which, there may be occasion to water it. When, however, the described qualities are found in the matter, it is fit for use, and vessels, &c. may be wrought of it without any other preparation, the case below excepted.

Composition of English china.

The following composition will produce wares, which will possess the properties of the true china, if judiciously managed.

Mix the best white sand, or calcined flints, finely powdered, twenty pound, of very white pearl-ashes, five pounds, of perfect white calcined bones, two pounds. Temper the whole with the gum arabic or senegal, dissolved in water.

This requires a considerable force and continuance of heat to bring it to perfection, but it will be very white and good when it is properly treated. Where mica can be obtained it is preferable to calcined bones, and as it will form a kind of paste for working, a weaker gum water will answer the purpose.

To bake China ware.

The furnace for this purpose may be constructed in the same manner as the potter's kiln's usually are; and Windsor bricks, with mortar of Windsor loam, or Stourbridge clay, should be employed in its fabrication. Where they are not to be procured, use bricks and clay nearest in their qualities of resistance. The size of the furnace should be according to the quantity of ware required to be baked; but it must not be too small, lest the body of fire may not be sufficient to produce the requisite heat.

The caffettes, or coffins, to contain the pieces when placed in the furnace, are the most material utensils. They should be of Stourbridge, or other good potter's clay, with a third of sand, and are generally made of a round form; with a flat bottom; the rim forming the sides, being adapted to the height of the pieces to be inclosed.

The furnace and caffettes being prepared; the ware to be baked must be sorted in the caffettes in the most advantageous manner as to room, and as many caffettes must be set upon them as the furnace will conveniently contain, leaving space for the free passage of the fire betwixt the piles: take care to cover over the uppermost caffettes in each pile, then close the mouth of the furnace, and raise the fire so as to heat the caffettes red hot in every part, and keep them red hot for twelve or fourteen hours. It is then to be extinguished, and the furnace left to cool gradually; and when little or no heat remains, the mouth may be opened, and the pieces taken out of the caffettes; when they will be in a condition to receive the glazing, or to be painted with such colours as are used under the glaze.

To make tobacco pipes.

These require a very fine, tenacious, and refractory clay, which is either naturally of a perfectly white colour, or, if it have somewhat of a grey cast, will necessarily burn white. A clay of this kind must contain no calcareous or ferruginous earth, and must also be carefully deprived of any sand it may contain by washing. It ought to possess, besides, the property of shrinking but little in the fire. If it should not prove sufficiently ductile, it may be meliorated by the admixture of another sort. Last of all, it is beaten, kneaded, ground, washed, and sifted, till it acquires the requisite degree of fineness and ductility. When, after this preparation, the clay has obtained a due degree of ductility, it is rolled out in small portions to the usual length of a pipe, perforated with the wire, and put, together with the wire, into a brass mould rubbed over with oil, to give it its external form; after which it is fixed into a vice, and the hollow part of the head formed with a stopper. The pipes, thus brought into form, are cleared of the redundant clay that adheres to the seams, a rim or border is made round the head, they are then marked with an iron stamp upon the heel, and the surfaces smoothed and polished. When they are well dried, they are put into boxes, and baked in a furnace.

To make crucibles.

Mr. Charles Cameron, Glasgow, has published a description of a new method of forming crucibles. The Dutch have long enjoyed an almost exclusive monopoly in the manufacture of the small melting-pot, or clay crucible, used by the jeweller and silversmith. I established a small manufactory of them, as follows: for each of the different sizes of the crucibles, I formed ten or twelve dozen of moulds of stucco, burnt and powdered in the usual manner. For the first mould of each size, I formed a piece of soft pipe clay into the shape of the intended crucible, and laid it with its mouth downwards on a flat surface, and inclosed it with a cylinder of white-iron, distant about half an inch from the angular points of the crucible, and about an inch and a half higher than its bottom: then mixing the stucco with water, poured it into the cylinder. When the stucco was sufficiently set, I removed the white-iron, picked out the clay, and dried the mould. I then squeezed soft clay into the mould, which on standing a few minutes, easily came out again. It was inclosed in the cylinder, and stucco poured round it, which formed a second mould, continuing to do so until I had procured the number wanted. They were then all put into a stove, and completely dried ready for use. In the preparation of the fire-clay for the crucibles, I followed precisely the same process used at the potteries, by mixing it with a very large quantity of water, and putting the whole through a No. 9 silk searce. On allowing the whole to stand a few hours, the clay subsided, and in pouring off the clear water, I procured the clay or slip of the consistence of thick cream. On weighing a gallon of it, I found the proportion of clay it contained, and added sand to the whole in the proportion of seven of sand to seventeen of clay; I then stirred and mixed the whole completely, when it was ready for use. I next took my moulds, previously dried, and arranged them in parallel rows on a table, and successively filled them with the prepared slip. By the time I had filled four or five dozen, I returned to the one first filled, and began alternately to pour the slip out of them, leaving a small quantity unpoured out, which subsided, and gave the requisite thickness to the bottom. In each of the moulds so filled, a crucible is completely formed by the abstraction of the water of the slip in contact with, and adjoining to, the porous substance of the stucco mould. The crucible will be either thicker or thinner in proportion to the time the slip has remained in it. Five or six dozen will not require more than fifteen minutes in being formed. The moulds with their contents are then removed to a stove, placed on their side, and built one above the other. In a short time, from the contraction of the clay, the crucibles easily part from the moulds, and are removed by introducing the finger into them. The moulds are allowed to remain in their situation until the water they had absorbed is completely evaporated, when they are again ready for re-filling, and will last for years. The crucibles remain in the stove until dry, after which they are burned in a kiln in the usual manner.

To make white glaze.

Take 26 parts of glass, 7 do. litharge, 3 do. nitre, 1 1-2 do. arsenic, 1-2 do. blue calx;—either fritted in a glass oven or not.

To make glaze.

Take 93 parts of lead, 45 do. stone, 25 do. flint, and 9 do. frit.

To make China glaze for printing blue frit.

Take 10 parts of glass, 2 do. lead, and 3 or 3 1-2 do. blue calx, as required.

To make white frit.

Take 16 parts of glass, 5 do. lead, 1 do. arsenic, 2 1-2 do. nitre.

Take 11 parts of white frit to the whole of blue frit, and grind them together. Then take off the mica frit, 8 parts of the above, 5 do. flint, 13 do. Cornish stone, 23 do. lead, and 6 oz. common salt.

To make cream coloured glaze.

Take 60 parts of Cornish stone, 20 do. flint, and 120 do. white lead. Stained with 1 oz. of smalts, as above.

To form a yellow glaze.

Take 2 parts of litharge, 2 do. tin-ash, and 1 do. antimony.

To prepare white glaze.

Take 15 parts of Cornish stone, 10 do. flint glass, 5 do. anica flint, 5 do. nitre, 5 do. borax, 1 do. common salt, and 1 do. sal soda; fritted in a glass oven. Then add 2 parts frit, as above, to 1 do. white lead. Send to mill to grind very fine, and stain with 7 oz. of blue calx.

To make a mixture for glaze.

Take 20 lbs. of white frit, 10 do. flint, 26 do. stone, 50 do. lead, and 4 oz. of blue.

To make a mixture of glaze for printing blue.

Take 6 parts of white frit, 5 do flint, 13 do. stone, 25 do. lead, and 55 do. glass.

To make a shining black glaze.

Take 100 parts of lead, 18 do. flint, and 40 do. manganese.

To make a purple under glaze.

Take 1-4 oz. of fluxed blue, 1 oz. manganese, 1 oz. red lead, and 1 oz. flint.

To prepare an olive sponge dip.

Take 1 quart of yellow slip, to 1 oz. zaffre.

To prepare a brown under glaze.

Take 8 oz. of glass antimony, 16 oz. of litharge, 3 oz. manganese, and 4 dr. blue calx.

To prepare a China glaze.

Take 42 parts of flint glass, 3 oz. blue calx. —Stain. 16 do. flint glass, 1 do. red lead, 1 arsenic, and 1 nitre.—White enamel. Run down in glass oven; then send with the above stain to the mill, 8 parts of white enamel, dry it and it will be fit for use. 8 parts of the above mixture (stain and white enamel,) 6 do. dry flint, 14 do. Cornish stone, 24 do. white stone, which, when sifted, is fit for use.

To prepare a China glaze for flotts.

Take 27 parts of flint, 15 do. nitre, 4 1-2 do. lime, 3 1-2 do. stain. This run down in glass oven, and, when sent to the mill, add 75 parts of glass, 15 do. lead, 10 do. white enamel, add 2 pailsful of lime, and, when it comes from the mill, add 135 parts of lead. Stain to the above, 10 parts of glass, and 5 oz. of blue.

To prepare white enamel.

Take 7 oz. of arsenic, 12 do. potash, 6 do. nitre, 5 do. glass, 2 do. flint, and 3 do. white lead.

To prepare China glaze.

Take 56 parts of stone, 46 do. borax, 18 do. glass, 15 do. flint, and 40 do. lead.

To prepare green edge glaze.

Take 20 parts of lead, 60 do. stone, 20 do. flint, and 10 do. ground glass.

To prepare materials for common ware.

Take 25 parts of flint, 60 do. stone, 95 do. lead, and 8 do. frit.

To prepare glaze for green edge.

Take 175 parts of lead, 100 do. stone, and 35 do. flint.

To prepare fluxes for blue printing.

Take 5 parts of blue calx, 5 1-2 do. coak stone, 1 1-2 do. glass, and 1 do. flint.

To prepare flux for black printing.

Take 7 1-2 parts of flint glass, 2 1-2 do. red lead, and 2 do. borax.

To prepare red flux.

Take 5 parts of lead, 1 oz. of borax, and 12 do. of glass.

To prepare black for printing.

Take 1 part of calcined copper, 1 1-4 do. red flux. Passed through the enamel kiln, 1 3-4 of calx, sent to the mill for grinding.

To prepare copper black.

Take 1 pound of calcined copper, pound fine, and put into the enamel kiln, and it will come out black. Then 1 1-2 oz. of red flux, put through the enamel kiln, 2d time; then 1 of the above, and 1 3-4 of flux, ground fine for use.

To prepare red for printing.

Take green copperas calcined to a fine powder, wash it well 10 or 12 days, and dry it; 1 of the above to 6 of red flux.

To prepare umber black.

Take 5 oz. of umber, 2 do. borax, 1 do. blue calx. One of the above to 2 flux, as under; 7 1-2 flint glass, 2 1-2 red lead, and 2 borax.

To prepare black.

Take 3 oz. of calcined umber, 1 do. borax: run down together. This will fine with gold.

To prepare oil for black printing.

Take half a pint of linseed oil, boiled well until of a proper consistence, to which add a small quantity of Barbadoes tar, prepared the same way.

Another.

Take 1 quart of linseed oil, 4 oz. flour of sulphur, 4 oz. balsam of sulphur, 8 oz. black rosin.

To form a cream colour body.

Take 2 cwt. blue clay, 1 do. black do. 3 qrs. flint, and 1 qr. Cornish stone.

To form another common body.

Take 3 cwt. black clay, 2 do. brown do. 2 do. blue do. 1 do. flint, 40 lbs. Cornish stone.

To form a blue printing body.

Take 2 parts black clay, 2 brown do. 4 blue do. 2 China do. 2 flint, and 1-2 Cornish stone.

Another.

Take 20 cwt. blue clay, 5 do. black do. 2 1-2 brown do. 2 cwt. China do. 2 do. flint, and 1-2 do. Cornish stone.

To make a chalk body.

Take 3 1-2 parts Moor clay, 3 do. raw pulverized flint, 2 do. blue ball clay, 4 dr. smalt. —FRIT.—Flint 2 parts, bone 3 3-4, lime 1-2, and potash 12.

Another.

Take 2 parts blue clay, 2 do. China do. 3 do. flint, and 1-8th Cornish stone.—FRIT.—10 parts glass, 15 do. stone, 5 do. flint, 3 do. borax.

To form a cane body.

Take 4 parts black marl, 2 do. Cornish stone, and 1 do. cream-colour clay.

To form a jasper body.

Take 3 parts coke stone, 2 do. Cornish do. 1 1-4 do. blue clay, 1-4 do. flint, and 1 dr. blue calx.

To form a drab body.

Take 2 parts blue clay, 1 do. China do. 3 do. composition, 1-2 do. Bradwell wood clay.

To form a pearl body.

Take 6 parts Cornish stone, 2 do. Derbyshire clay, 1 do. flux. FLUX, 8 parts glass, 2 1-2 do. red lead.

To form a stone body.

Take 2 parts blue clay, 2 do. China do. 4 do. composition.

To form an Egyptian black body.

Take blue clay, 30 parts, black marl, 5 do. calcined car, 25 do. manganese, 2 do.

To form a China body.

Take blue clay, 12 parts, china do. 6 do. bone, 12 do. Cornish stone, 12 do. flint, 6 do. flint glass, 2 do.

Common glazing for earthen ware.

Take of white sand, 40 lbs. red lead 20 lbs. pearl-ashes, 20 lbs. common salt, 12 lbs. Powder the sand by grinding before it be mixed with the other ingredients, and then grind them together, after which, calcine them for some time with a moderate heat, which must be less than will make them melt and run to glass; and when the mixture is cold, grind it to powder again, and, when wanted, temper it with water, and it will then be fit for use.

The proportions of these ingredients may be varied occasionally, for where the glazing can be fluxed conveniently with a very strong fire, the quantity of sand may be increased to 60 or 70 lbs. which, not only renders the glazing stronger, but makes a saving in the expense. The proportion of pearl-ashes may likewise be diminished, or they may be wholly omitted where the ware is designed for very coarse purposes, and not for domestic uses, where the lead is very improper, being extremely apt to be corroded by acids, and to produce a very unwholesome substance. On this account, where good manufactories are established, the lead ought to be excluded from the composition of the glazings, and other fluxes used in its stead, as in the following.

Transparent glazing for earthen ware.

Take of white sand, 40 lbs. of pearl-ashes, 21 lbs. and of common salt, 15 lbs. Calcine, and proceed as above.

Where the expense is no object, this glazing may be improved by adding one or two pounds of borax, and diminishing the pearl-ashes, in the proportion of six pounds for one pound of borax added, or ten pounds for two; in the latter case, two pounds of salt may be also kept out of the composition. The reason for this change is, that if the composition contain so large a proportion of salt, and the glazing be not fluxed for a long time after it is laid on the ware, it will be apt to be dissolved by boiling water, and peel off, if it be exposed to the action of it for any long time.

Another.

Take of sand, 40 lbs. of wood-ashes, perfectly burnt, 50 lbs. of pearl-ashes, 10 lbs. of common salt, 12 lbs.

This will make an admirable glazing, where the ashes are pure, and a strong fire can be given to flux it when laid on the ware. It will be perfectly free from the imperfection of the above, and will be very hard and glossy, and where the expense can be afforded, it may be made more yielding to the fire by the addition of borax, in which case no alteration need be made in the proportion of the other ingredients.

To prepare masticot used as the ground of glazing.

Take of clean sand, one hundred weight; of soda, 44 lbs. and of pearl-ashes, 30 lbs. Calcine the mixture.

This is the Dutch method, but the soda not being employed in this country; those who would use masticot must increase the quantity of pearl-ashes in an equivalent proportion, and therefore 70 pounds should be employed instead of the 30.

Masticot for white glazing.

Take of masticot, prepared as in the preceding, one hundred pounds, calx of tin, 80 lbs. and of common salt, 10 lbs. Calcine and powder this composition three several times.

This calx of tin is prepared and sold under the name of putty. Its goodness consists in its whiteness and purity; the first of which is easily known by comparing it with a specimen of any that is known to be good.

Another preparation.

Take of mastic, 10 lbs. red lead, 60 lbs. calcined tin or putty, 20 lbs. and of common salt, 10 lbs. Mix them, and calcine and powder the mixture several times.

Another.

Take 2 lbs. of lead, and somewhat more than 1 pound of tin. Calcine the two metals till reduced to a powder, by the means used by potters. Then take two parts of these ashes, one part of white sand, calcined flints, or broken white glass, and half a pint of common salt. Mix well together the several ingredients, and set the matter to bake in a proper furnace, and urge it at length to melt.

The trouble of calcining the tin and lead may be saved here, as well as on the occasions above-mentioned, by procuring them already reduced to a proper state.

Another.

Take 1 1-2 lbs. of lead, and 1 lb. of tin. Reduce them to a state of a calx, and then take of the calcined matter, 8 parts, and of calcined flints and common salt, each 4 parts. Bring the mixture, by heat, to a state of fusion.

Another.

Take of lead, 3 parts, and of tin, 1 part. Calcine them, and then take of this matter, and of calcined flints, and common salt, each 2 parts. Fuse them as above.

Another.

Take of lead, 4 lbs. tin, 1 lb. Calcine them, and take of the matter, 8 parts, of calcined flints, 7 parts, and of common salt, 4 parts. Fuse them as the others.

White glazing for copper vessels.

Take of lead, 4 lbs. of tin, 1 lb. of flints, 4 lbs. of common salt, 1 lb. and Venetian glass, 1 lb. Melt the mixture, and it will be fit for use.

Another.

Take of lead, 4 lbs. and of tin, 1 lb. Calcine them, and take of the matter, 12 parts, of flints, 14 parts, and of common salt, 8 parts. Fuse them as the others.

Very fine white glazing.

Take of lead, 2 parts, and of tin, 1 part. Calcine them, and take of the matter, one part, of flints and common salt, each one part. Fuse the mixture.

Enamel for earthen ware.

Take of tin, any quantity, and inclose it in clay or loam, and put it in a crucible. Place the crucible in the fire, that the tin may calcine, and then break it. There will be a pound of calx very white, and when it is used to paint with, on a white ground, the colour will come forth and be much whiter than that of the ground.

Yellow glazing.

Take of tin and antimony, each 2 lbs. of lead 3 lbs. or according to some, equal quantities of all the three ingredients. Calcine the whole, and put them at least in fusion, that they may be vitrified. This glazing will run very soon, and be of a fine yellow colour.

The calcining the tin, lead, and antimony together, as here directed, would be a very tedious operation. The calcined tin, and red lead, should therefore be used, and the antimony calcined alone. But it is not to be understood that the antimony is to be calcined for this purpose to whiteness, or the state of a perfect calx, which is not easily practicable without nitre, and, if effected, would render the antimony incapable of producing any other colour than white. The operation must therefore be performed with a slow fire, by roasting, as it were, the antimony till it lose its metallic appearance, and become a greenish powder, as is practised in making the glass of antimony.

Another.

Take 5 parts of red lead, 2 parts of powdered bark, 1 part of sand, 1 part of any of the preceding white glazings, and 2 parts of antimony. This mixture must be calcined, and then fused, and it will give a fine yellow glazing.

Another.

Take 7 parts of the mixture of the calxes of tin and lead, mentioned before in the recipe for preparing the masticot for a white glazing. Add 1 part of antimony, and fuse them together.

Another.

Take 4 parts of white glass, 1 part of antimony, 3 parts of red lead, and 1 part of iron scales. Fuse the mixture.

Another.

Take 16 parts of flints, 1 part of filings of iron, and 24 parts of litharge. Fuse the mixture.

Lemon-coloured glazing.

Take of red lead 3 parts, of powdered bricks, very red, 3 parts and a half, and of antimony, 1 part. Calcine the mixture day and night for the space of 4 days, in the ash-hole of a glass house furnace. Urge it at last to fusion, and it will produce a very fine lemon-coloured glazing.

The success of this operation depends greatly on the fineness of the colour of the bricks that are powdered. Those which are of a fine red, and very brittle, are the best; but such as are grey will not at all answer the end. The same attention should be paid to this matter, wherever bricks are used in these kinds of preparations.

Light yellow glazing.

Take of red lead, 4 parts, of antimony, 3 parts, of the mixture of calxes of lead and tin, before mentioned in the masticot for white glazing, 8 parts, and of glass, 3 parts.

When the red lead and calx of tin are used, the proportion of the ingredients will be, of red lead, 10 parts, of antimony and glass, each 3 parts, and of calcined tin, 2 parts.

Gold-coloured glazing.

Take of red lead, 3 parts, of antimony, 2 parts, and of saffron of Mars, 1 part. Fuse the mixture, and, having powdered the mass, melt it again, and repeat this operation till the fourth time, and a fine gold-coloured yellow will be produced.

Any preparation of the calcined iron may be used in the place of the saffron of Mars, and the repeated fusions and levigations seem unnecessary.

Another.

Take of red lead and white flints, each 12 parts, and of filings of iron, 1 part. Fuse them twice.

This glazing will be transparent. Care must therefore be taken what ground it be laid upon, or it will not answer the end of a yellow, but combine with that of the ground; and, indeed, the body of colour is too weak to produce any other than a faint yellowish cast even on a pure white ground.

Green glazing to be laid on a white ground.

Take of calcined copper, 1 part, and 2 parts of any of the preceding yellow glazings. Fuse them twice, but when the composition is used, it must not be laid on too thick, for that would render the colour too deep.

Fine green glazing.

Take of the Bohemian granite, 1 part, of filings of copper, 1 part, of red lead, 1 part, and of Venetian glass, 1 part. Fuse the whole, and it will afford a very fine green. But the mixture may be used without being previously melted.

Fine blue glazing.

Take of red lead, 1 lb. powdered flints, 2 lbs. common salt, 2 lbs. tartar, 1 lb. Calcine till it be almost white. White or Venetian glass, 1-2 lb. and zaffre, 1-2 lb. Fuse the whole mixture, and quench the melted mass in water. Repeat the same operation several times. The same proceeding must be adhered to in all the compositions where the tartar enters, otherwise they would be too much charged with salt, and the colour would not prove fine. It is proper, moreover, to calcine the mixture gently, day and night, for 48 hours, in a glass-house furnace.

Another.

Take 1 pound of tartar, 1-4 of a pound of red lead, 1-2 an oz. of zaffre, and 1-4 of a pound of powdered flints. Fuse the whole, and proceed in the manner stated above.

Violet-blue glazing.

Take 12 parts of tartar, and an equal quantity of flints and zaffre. Proceed as with the above.

Another.

Take 4 oz. of tartar, 2 oz. of red lead, 5 oz. of powdered flints, and 1-2 a drachm of magnesia. Proceed as with the above.

Fine red glazing.

Take 3 pounds of antimony, 3 pounds of red lead, and 1 pound of rust of iron. Grind the whole as fine as possible, and then paint with it.

Another.

Take 2 lbs. of antimony, 3 lbs. of red lead, and 1 lb. of calcined saffron of Mars. Proceed as with the above.

Another.

Take pieces of white glass, and reduce them to an impalpable powder. Take afterwards, vitriol calcined to redness, or rather the *caput mortuum* which is left after the distillation of the oil of vitriol. Edulcorate the calcined vitriol or *caput mortuum*, by washing with water to free it from the salts, and then mix as much of it as there may be occasion for with the powdered glass. By this means a very fine red will be obtained, that may be used for painting; after which the work must be burnt.

To prepare varnish for pottery ware, free from lead.

Melt and keep in fusion, for 15 minutes, a mixture of an oz. of fire-stone and pounded glass; 2 drachms of salt, half an oz. of pipe clay, and an oz. and a half of borax. Varnish the pots over with this matter, after they have been in the fire, and put them again in it for about 18 hours.

Varnish for earthenware.

This varnish is made of equal parts of white-glass and soda, finely pulverized, carefully sifted, and mixed.

Chinese mode of glazing china.

They take the finest pieces of the petunse and treat them as before mentioned, by pounding and washing over; but extract by repeated washings over the very finest part of the powder, which keeps so moist with the water, that the mixture forms a liquid mass, which they call the oil of petunse. With this oil they mix an equal weight of borax, they then slake a quantity of quick lime, and form layers of that and dried furze; which they set on fire. When they have raised a large heap, after the first one is burnt to ashes; they collect them and the lime, and form layers of them again, with a fresh quantity of the furze, which they burn as before, and they repeat this five or six times. They then put the ashes and lime into a vessel with water, adding some borax in the proportion of one pound to a hundred weight of the ashes; they next wash over the finer part of this mixture, and pour off at last all fluid from the dregs, which they keep together with the solid part, washed over. They mix this composition of lime, ashes, and salts, with the mixture above mentioned, of an equal quantity of the oil of petunse and borax, and this compound forms the matter for glazing the ware.

Instead of the petunse, the spar of lead used in the Saxon manufacture may be employed for forming a similar glazing, by treating it in the same manner: and, it is said, the glazing of the Drespen china is actually made in this way.

English glazing for china.

Take of the finest white sand, or calcined flints, 20 pounds; of red lead, 18 pounds; of pearl-ash, 10 pounds; and of common salt, depreciated, 4 pounds levigate the sand or calcined flints and red led well together; and afterwards mix them thoroughly with the pearl-ash and common salt, fuse the compound in the manner directed for the treatment of glass, till it be perfectly vitrified. Then, separate the fragments of the pot carefully from it, and reduce it in a flat, agate, or porphyry mortar, to an impalpable powder; finally temper it with water to the proper consistence for painting or glazing.

Modification of the above.

When this glazing is used for embossed, or other fine work, it should be mixed with a third of its weight of the spar of lead, or other vitrescent earth, in lieu of the petunse, in the composition of the ware paste. Take care that this earth is formed of the best pieces of spar, or other substance used: and that it is rendered to an extreme fineness, by washing over. The design of this addition is to weaken the fluxing powder of the glaze; which, if used alone, would run the corners and edges of the smaller part, and impair the sharpness and spirit of the work. It is necessary to pursue the same method with pieces that are to be painted with more delicate designs for the glazing melting otherwise again, in the burning in of the colours, would become too fluid, and spread them so as to take away the effect of the fine touches.

To glaze without lead.

M. Westrumb, a German chemist, in consequence of numerous experiments, has published the successful result of several compositions, in which not a particle of lead is employed, and which in his opinion will prove an useful glazing for ordinary vessels. First, 32 parts of sand; 11, 15, or 20 parts of purified potash; and from 3 to 5 parts of borax. Second, 32 parts of glass (we suppose flint-glass,) 16 parts of borax, and 3 parts of pure potash. Third, 150 parts of crystallized Glauber's salt, with 8 parts of pulverized charcoal, previously roasted, till it has acquired a grey colour; 16 parts of sand, and 8 parts of borax.

Another method of glazing without lead, has been invented by a potter at Leipzig: it consists of half a pound of saltpetre, half a pound of potash, and 1 pound of common salt. This composition is not very expensive, and is said to produce an enamel not inferior to that prepared with lead.

To apply on every kind of hardware colours which produce herborisations.

Herborisations can be of all colours; but the most agreeable is that called bistre, which is composed in the following manner:—

A pound of calcined manganese; 6 oz. of burnt iron straw, or a pound of iron ore, and 3 oz. of flint-powder.

The manganese and straw or iron ore must be pounded separately in a mortar, after which the whole is calcined together in an earthen-pot. This mixture, thus prepared, is all pounded together, and then mixed in a small tub of water.

The blue, green, and other colours must be composed of the divers substances known to produce them, and mixed, calcined, and pounded in the same manner as for the bistres.

To make the application of these various colours to the pieces, it is necessary, instead of diluting them with water, as is practised for ordinary painting, to make use of any kind of mordant. The most advantageous, and which are employed with the greatest success, are urine, and the essence of tobacco.

If the essence of tobacco is made use of, infuse 2 oz. of good tobacco in leaves, during 12 hours, in a bottle of cold water, or very simply infuse the 2 oz. of tobacco in a bottle of hot water.

The pieces of clay, after taking a little consistency, are steeped in white or coloured worm-seed, until the bath puts them in a state of moisture. To produce herborisations, it will be sufficient, whilst the worm-seed is still fresh, and at the moment when the piece is taken down from the tub, to lay on slightly, and with a brush, one or several drops of other colours: each drop produces a tree more or less great, according as the workman has charged his brush with colours.

To ornament all kinds of glass in imitation of engraving, &c.

The method heretofore known for engraving on glass, has been by means of a machine with wheels, of different substances, which have been employed with sand, &c. to grind off some parts of the surface of the glass which is to be engraved on, and then by means of grinding and polishing different parts on the rough surface, the different figures are formed according to the designs given. By this invention, instead of grinding or taking off any part of the surface of the glass, the patentee lays on an additional surface or coating of glass, prepared for the purpose, which, when subjected to a proper degree of heat, will incorporate with the glass to be operated upon, so as to produce an effect similar to that which has hitherto been obtained by means of grinding. When it is required to ornament glass, then, previously to the heat being applied, with an etching or engraving tool, such parts are to be taken out as will produce the required effect, and that in a much superior way to the effect produced by the usual mode of grinding, polishing, &c. The materials used are to be melted in a crucible, or other pot, and they are to be made up in the same manner as if used for the making of the best flint glass, broken glass, or as it is usually denominated "cullitt," being the principal ingredient in it. Several mixtures are given, of which the first is, 160 parts of cullitt, 10 of pearl-ashes, 40 of red-lead, and 10 of arrence.

The second is, 120 parts of cullitt, 160 of red-lead, 60 of sand, and 60 of borax.

The third is, 70 parts of red-lead, 22 1-2 of sand, and 410 of calcined borax.

When these are subjected to such a heat as to be thereby completely fused, take equal parts of each mixture, and grind them to an impalpable powder, for the purpose of being mixed with a menstruum proper for coating the glass.

The menstruum consists of one part of double refined loaf sugar, dissolved in two parts of pure water: to which is added, at the time of mixing the powder, about one-third part of common writing ink—the effect, we are told, produced by this addition of oxyde of manganese, used in a small quantity by the glass-makers, in making their best flint-glass, because without such an addition the specimens would be of a cloudy or milky appearance. A quantity of this menstruum is used sufficient to render the ground-mixture of a proper consistence for laying on with a thin smooth surface. When the coating or mixture is thus prepared, the glass is to be coated by means of a camel's hair brush, or squirrel's foot, &c. it is then to be exposed to a heat sufficient to produce a semi-vitrification of the coaty surface, and to incorporate it with the substance or body of glass so coated. But the heat must not be carried higher than this, because, in that case, a complete vitrification would ensue, and the desired effect of having a surface in imitation of the rough surface produced by grinding, would not be obtained: the article must, under such circumstances, be re-coated, and submitted again to the fire. If, after the coating has been applied, any borders, cyphers, or other ornaments, are wanted to be executed thereon, then previously to the heat being applied with an etching or engraving tool, such parts of the coated surface must be chased out, as will produce the desired effect, after which the requisite degree of heat is to be applied.

This invention is not only applicable to all kinds of useful and ornamental articles of glass-ware, on which the common methods of engraving have been practised, but may be applied to window-glass and plate-glass of every description, in place of grinding, for the purpose of making window-blinds. It is also said to be peculiarly adapted to produce beautiful specimens of art, for the windows or altar-pieces, libraries, museums, coach-windows, and for the glass used in ornamental buildings of all descriptions. This invention has another advantage over the common method, by the work wearing much cleaner than the work of ground-glass; the surface of which being fractured by the action of the wheel, &c. is therefore liable to gather dirt on the rough unpolished parts of the borders, &c.

To make the Bologna phial.

The Bologna, or philosophical phial, is a small vessel of glass, which has been suddenly cooled, open at the upper end, and rounded at the bottom. It is made so thick at the bottom, that it will bear a smart blow against a hard body, without breaking; but if a little pebble, or piece of flint is let fall into it, it immediately cracks, and the bottom falls into pieces: but unless the pebble or flint is large and angular enough to scratch the surface of the glass, it will not break.

To make Prince Rupert's drops.

Prince Rupert's drops are made by letting drops of melted glass fall into cold water; the drop assumes by that means an oval form with a tail or neck resembling a retort. They possess this singular property, that if a small portion of the tail is broken off, the whole bursts into powder, with an explosion, and a considerable shock is communicated to the hand that grasps it.

To break glass in any required way.

Dip a piece of worsted thread in spirits of turpentine, wrap it round the glass in the direction required to be broken, and then set fire to the thread, or apply a red-hot wire round the glass, and if it does not immediately crack, throw cold water on it while the wire remains hot. By this means glass that is broken may often be fashioned, and rendered useful for a variety of purposes.

GLASS.

To manufacture glass.

Glass is a combination of sand, flint, spar, or some other silicious substances, with one or other of the fixed alkalies, and in some cases with a metallic oxyd. Of the alkalies, soda is commonly preferred; and of the silicious substances, white sand is most in repute at present, as it requires no preparation for coarse goods, while mere washing in water is sufficient for those of a finer quality. The metallic oxyd, usually employed, is litharge, or some other preparation of lead, as being the cheapest metal.

The silicious matter should be fused in contact with something called a flux. The substances proper for this purpose are lead, borax, arsenic, nitre, or any alkaline matter. The lead is used in the state of red lead; and the alkalies are soda, pearl-ashes, sea-salt, and wood-ashes. When red lead is used alone, it gives the glass a yellow cast, and requires the addition of nitre to correct it. Arsenic, in the same manner, if used in excess, is apt to render the glass milky. For a perfectly transparent glass, the pearl-ashes are found much superior to lead; perhaps better than any other flux, except it be borax, which is too expensive to be used, except for experiments, or for the best looking-glasses.

The materials for making glass must first be reduced to powder, which is done in mortars or by horse mills. After sifting out the coarse parts, the proper proportions of silex and flux are mixed together, and put into the calcining furnace, where they are kept in a moderate heat for 5 or 6 hours, being frequently stirred about during the process. When taken out, the matter is called frit. Frit is easily converted into glass by only pounding it, and vitrifying it in the melting pot of the glass furnace: but in making fine glass, it will sometimes require a small addition of flux to the frit to correct any fault. For, as the flux is the most expensive article, the manufacturer will rather put too little at first than otherwise, as he can remedy this defect in the melting pot. The heat in the furnace must be kept up until the glass is brought to a state of perfect fusion; and during this process any scum which arises must be removed by ladles. When the glass is perfectly melted, the glass blowers commence their operations.

For the best flint-glass, 120 lbs. of white sand, 50 lbs. of red lead, 40 lbs. of the best pearl ashes, 20 lbs. of nitre, and 5 oz. of magnesia; if a pound or two of arsenic be added, the composition will fuse much quicker, and with a lower temperature.

For a cheaper flint glass, take 120 lbs. of white sand, 35 lbs. of pearl-ashes, 40 lbs. of red lead, 13 lbs. of nitre, 6 lbs. of arsenic, and 4 oz. of magnesia.

This requires a long heating to make clear glass; and the heat should be brought on gradually, or the arsenic is in danger of subliming before the fusion commences. A still cheaper composition is made by omitting the arsenic in the foregoing, and substituting common sea-salt.

For the best German crystal glass, take 120 lbs. of calcined flints or white sand, the best pearl-ashes, 70 lbs. saltpetre, 10 lbs. arsenic, 1-2 a lb. and 5 oz. of magnesia. Or, a cheaper composition for the same purpose is 120 lbs. of sand or flints, 46 lbs. of pearl-ashes, 7 pounds of nitre, 6 pounds of arsenic, and 5 ounces of magnesia. This will require a long continuance in the furnace; as do all others where much of the arsenic is employed.

For looking-glass plates, washed whites and, 60 pounds, purified pearl-ashes, 25 pounds, nitre, 15 pounds, and 7 pounds of borax. If properly managed, this glass will be colourless. But if it should be tinged by accident, a trifling quantity of arsenic, and an equal quantity of magnesia, will correct it: an ounce of each may be tried first, and the quantity increased if necessary.

The ingredients for the best crown-glass must be prepared in the same manner as for looking-glasses, and mixed in the following proportions: 60 pounds of white sand, 30 lbs. of pearl-ashes, and 15 pounds of nitre, 1 pound of borax, and half a pound of arsenic.

The composition for common green window-glass is, 120 pounds of white sand, 30 pounds of unpurified pearl-ashes, wood-ashes, well burnt and sifted, 60 pounds, common salt, 20 pounds, and 5 pounds of arsenic.

Common green bottle-glass is made from 200 pounds of wood-ashes, and 100 pounds of sand; or 170 pounds of ashes, 100 pounds of sand, and 50 pounds of the lava of an iron furnace: these materials must be well mixed.

The materials employed in the manufactory of glass are by chemists reduced to three classes, namely, alkalies, earths, and metallic oxides.

The fixed alkalies may be employed indifferently; but soda is preferred in this country. The soda of commerce is usually mixed with common salt, and combined with carbonic acid. It is proper to purify it from both of these foreign bodies before using it. This, however, is seldom done.

The earths are silica (the basis of flints,) lime, and sometimes a little alumina (the basis of clay.) Silica constitutes the basis of glass. It is employed in the state of fine sands or flints: and sometimes, for making very fine glass, rock crystals is employed. When sand is used, it ought, if possible, to be perfectly white, for when it is coloured with metallic oxides, the transparency of the glass is injured. Such sand can only be employed for very coarse glasses. It is necessary to free the sand from all the loose earthy particles with which it may be mixed, which is done by washing it well with water.

Lime renders glass less brittle, and enables it to withstand better the action of the atmosphere. It ought in no case to exceed the 20th part of the silica employed, otherwise it corrodes the glass pots. This indeed may be prevented by throwing a little clay into the melted glass; but in that case a green glass only is obtained.

The metallic oxyds employed are the red oxyd of lead or litharge, and the white oxyd of arsenic. The red oxyd of lead, when added in sufficient quantity, enters into fusion with silica, and forms a milky hue like the dial plate of a watch. When any combustible body is present, it is usual in some manufactories to add a little white oxyd of arsenic. This supplying oxygen, the combustible is burnt, and flies off, while the revived asenic is at the same time volatilized.

There are several kinds of glass adapted to different uses. The best and most beautiful are the flint and the plate-glass. These, when well made, are perfectly transparent and colourless, heavy and brilliant. They are composed of fixed alkali, pure silicious sand, calcined flints and litharge, in different proportions. The flint-glass contains a large quantity of oxyd of lead, which by certain processes is easily separated. The plate-glass is poured in the melted state upon a table covered with copper. The place is cast 1-2 an inch thick or more, and is ground down to a proper degree of thinness, and then polished.

Crown-glass, that used for windows, is made without lead, chiefly of fixed alkali fused with silicious sand, to which is added some black oxyd of manganese, which is apt to give the glass a tinge of purple.

Bottle-glass is the coarsest and cheapest kind: into this little or no fixed alkali enters the composition. It consists of an alkaline earth combined with alumina and silica. In this country it is composed of sand and the refuse of the soap-boiler, which consists of the lime employed in rendering this alkali caustic, and of the earthy matters, with which the alkali was contaminated. The most fusible is flint glass, and the least fusible is bottle-glass.

Flint glass melts at the temperature of 10° Wedgewood, crown-glass at 30°, and bottle-glass at 47°. The specific gravity varies between 2.48 and 3.38.

Glass for looking-glass plates, No. 1.

Take of white sand cleansed, sixty pounds, of purified pearl-ashes, twenty-five pounds, of salt-petre, fifteen pounds, and of borax, seven pounds.

This composition should be continued long in the fire, which should be for some time strong, and afterwards more moderate, that the glass may be entirely free from bubbles before it be worked. It will be entirely clear of all colour, unless in case of some accident: but if any yellow tinge should, nevertheless, unfortunately infect it, there is no remedy, except by adding a small proportion of magnesia, which should be mixed with an equal quantity of arsenic, and after their being put into the glass, giving it a considerable heat again, and then suffering it to free itself from bubbles in a more moderate one, as before. If the tinge be slight, an ounce of magnesia may be first tried, and if that prove insufficient, the quantity must be increased, but the glass will always be obscure in proportion to the quantity that is admitted, .

Looking-glass plates No. 2.

Take of the white sand, 60 lbs. of pearl-ashes, 20 lbs. of common salt, 10 lbs. of nitre, 7 lbs. and of borax, 1 lb.

This glass will run with as little heat as the former, but it will be more brittle, and refract the rays of light in a greater degree.

Crown or best window glass. No. 1.

Take of white sand sixty pounds, of purified pearl ashes thirty pounds, of salt-petre fifteen pounds, of borax one pound, and of arsenic half a pound.

This will be very clear and colourless, if the ingredients be good, and will not be very dear. It will run with a moderate heat; but if it be desired to be yet more fusible and soft, half a pound or a pound more of arsenic may be added.

If the glass should prove yellow, the magnesia must be used as above directed for the looking-glass.

Cheaper kind of window glass, No. 2.

Take of white sand sixty pounds, of unpurified pearl ashes twenty five lbs. of common salt ten pounds, of nitre five pounds, of arsenic two pounds, and of magnesia one ounce and a half.

This will be inferior to the above kind, but may be improved, where desired, by purifying the pearl-ashes.

Common or green window glass, No. 3.

Take of white sand sixty pounds, of unpurified pearl-ashes thirty pounds, of common salt ten pounds, of arsenic two pounds, and of magnesia 2 oz.

This is a cheap composition, and will not appear too green, nor be very deficient in transparency.

Common or green window glass, No. 4.

Take of the cheapest kind of white sand, one hundred and twenty pounds, of unpurified pearl-ashes, thirty pounds, of wood-ashes, well burnt and sifted, 60 pounds, of common salt twenty pounds; and of arsenic five pounds.

This composition is very cheap, and will produce a good glass with a greenish cast.

Best phial glass, No. 1.

Take of white sand one hundred and twenty pounds, of unpurified pearl ashes fifty pounds, of common salt ten pounds, of arsenic five pounds, and of magnesia five ounces.

This will be a very good glass for the purpose, and will work with a moderate heat, but requires time to become clear, on account of the proportion of arsenic; when, however, it is once in good condition, it will come very near to the crystal glass.

Cheapest green or common phial glass, No. 2.

Take of the cheapest kind of white sand, one hundred and twenty pounds; of wood ashes, well burnt and sifted, eighty pounds; of pearl-ashes, twenty pounds; of common salt, fifteen pounds; of arsenic one pound.

This will be green, but tolerably transparent, and will work with a moderate fire, and vitrify quickly with a strong one.

Green or bottle glass.

Take of wood-ashes two hundred pounds, and of sand one hundred pounds. Mix them thoroughly well by grinding together.

This is the due proportion where the sand is good, and the wood-ashes are used without any other addition.

The same, with the addition of scoria.

Take of wood-ashes one hundred and seventy pounds; of sand one hundred pounds; and of scoria, or clinkers, fifty pounds. Mix the whole well by grinding them together.

The clinkers should be well ground before they be used, if they admit of it: but frequently they are too hard, and in that case they should be broken into as small bits as can be done conveniently, and mixed with the other matter without any grinding. The harder they are the less material will be the powdering of them, as they will the sooner melt of themselves in the furnace, and consequently mix with the other ingredients.

The most perfect kind of flint-glass No. 1.

Take of the white sand, 120 lbs. red lead, 50 lbs. the best pearl-ashes, 40 lbs. nitre, 20 lbs. magnesia, 5 oz.

If this composition be fused with a very strong fire, and time be given to it, a glass will be produced that will have the play of the best flint-glass, and yet be hard and strong. It is not so cheap as the compositions given below, where arsenic or common salt is introduced, or where more of the pearl-ashes are used; in either of which cases, savings may be made by diminishing proportionably the quantity of nitre. But the qualities of this glass will be found to come nearer to the standard of perfection, which is to unite the lustre and hardness together in the greatest degree they are compatable with each other.

If this composition be, however, desired to flux with less heat, and quicker, a pound or two of arsenic may be added, which will be found effectually to answer the purpose.

Flint glass, No. 2.

Take of sand, 120 lbs. the best pearl-ashes, 54 lbs. red lead, 36 lbs. nitre, 12 lbs. magnesia, 6 oz.

This will require much the same heat as the other, but will be harder in its texture. If it be desired to be made more yielding to the fire, arsenic may be added, or the quantity of sand may be lessened. In these cases the glass will be softer and weaker.

Flint glass, No. 3.

Take of white sand, 120 lbs. the best pearl-ashes, 35 lbs. arsenic, 6 lbs. magnesia. 4 oz.

This glass will require a considerable time in the fire to become clear, and must not, if it can be avoided, be strongly urged at first. This glass will not be so hard as those of the above compositions, but it will be very clear, and may be employed for large vessels, where a sufficient thickness can be allowed to give them strength.

Cheaper composition of glass, No. 4.

Take the proportions of the other ingredients given in the last, and omitting the arsenic, add, in its stead, 15 lbs. of common salt.

This will be more brittle than the last, and therefore cannot be recommended, unless for the fabrication of such kind of vessels, or other pieces, where the strength is of little moment.

Cheapest composition of Flint glass, No. 5.

Take of the white sand, 120 lbs. red lead, 30 lbs. the best pearl-ashes, 20 lbs. nitre, 10 lbs. common salt, 15 lbs. arsenic, 6 lbs.

This glass will fuse with a moderate heat, but requires time, like the last, to take off the milky appearance of the arsenic; it is yet softer than the last, and may therefore be deemed the worst kind of flint that can be made.

Best German crystal-glass, No. 6.

Take of the calcined flints, or white sand, 120 lbs. the best pearl-ashes, 70 lbs. salt petre, 10 lbs. arsenic, 1-2 lb. magnesia, 5 oz.

If the pearl-ashes be pure and good, this glass will equal the best of this kind that ever was made. Borax has been frequently used also in the compositions for this sort of glass, but its great price, without any equivalent advantage, will deter from the employing it in large manufactures, as there is no sort of transparent glass, (plate excepted,) that can bear the expense of it.

German crystal glass No 7.

Take of calcined flints, or white sand, 120 lbs. pearl-ashes, 46 lbs. magnesia 5 oz.

This composition requires a long continuance of heat, on account of the arsenic, for the reason before given. It produces a glass equally or more transparent and colourless than the preceding, but somewhat more brittle. The arsenic is, however, so disagreeable an ingredient, from the deleterious qualities of the fumes, which will necessarily rise copiously till the fusion of the other ingredients check it, that, where the advantage is not more considerable than the saving arising from the difference of these two recipes, it is scarcely worth while to submit to the inconvenience of it.

To anneal glass.

Nealing, as it is called by the workmen, is a process in the glass houses, and consists in putting the glass vessels, as soon as they are formed, and while they are yet hot, into a furnace or an oven, not so hot as to re-melt them, and in which they are suffered to cool gradually. This is found to prevent their breaking easily, particularly on exposure to heat.

A similar process is used for rendering cast-iron vessels less brittle, and the effect depends on the same principles.

To polish and grind glass.

To grind plate-glass, lay it horizontally upon a flat stone table, made of a very fine grained freestone; and for its greater security, plaister it down with mortar or stucco. The stone table is supported by a strong wooden frame, with a ledge all round its edges, rising about two inches above the glass. Upon the plate to be ground is laid another rough glass, not above half as big, and so loose as to slide upon the former; but cemented to a wooden plank, to guard it from the injury it must otherwise receive from the scraping of the wheel whereto the plank is fastened, and from the weights laid upon it to promote the triture or grinding of the glasses. The whole is covered with a wheel made of hard light wood, about six inches in diameter; by pulling of which backwards and forwards alternately, and sometimes turning it round, the workmen who always stand opposite to each other, produce a constant attrition between the two glasses, and bring them to what degree of smoothness they please, by first pouring in water and coarse sand; after that a finer sort of sand, as the work advances, till at last they pour in the powder of smalt. As the upper or incumbent glass becomes smooth, it must be removed, and another, from time to time, substituted for it.

The engine just described is called a mill by the workmen, and is employed only in grinding the largest-sized glasses. In grinding lesser glasses, they usually work without a wheel, having four wooden handles fastened to the corners of the stone that loads the upper plank, by which they work it about. The grinders' part done, the glass is turned over to the polisher, who, with fine powder of tripoli stone or emery, brings it to a perfect evenness and lustre. The instrument made use of in this branch, is a board furnished with a felt and small roller, which the workmen moves by means of a double handle at both ends. The artist, in working this roller, is assisted by a wooden hoop, or spring, to the end of which it is fixed; for the spring, by constantly bringing the roller back to the same points, facilitates the action of the workman's arm.

To make frit.

Frit, in the glass manufacture, is the matter or ingredients of which glass is to be made, when they have been calcined or baked in a furnace. There are three kinds of frit: the first, crystal frit, or that for crystal or clear glass, is made with salt of pulvarine and sand. The second and ordinary frit is made of the bare ashes of the pulvarine or barilla, without extracting the salt from them. This makes the ordinary white or crystal glass. The third is frit for green glasses, made of common ashes, without any preparation. This last frit will require ten or twelve hours baking. The materials in each are to be finely powdered, washed, and searced: then equally mixed, and frequently stirred together in the melting pot.

To bring pearl-ashes, or any other fixed alkaline salt to the highest degree of purity.

Take of the best pearl-ashes, 3 lbs. and of salt-petre, 6 oz. Pound them together in a glass or marble mortar, till they are thoroughly well mixed, and then put part of them into a large crucible, and set it in a furnace, where it may undergo a strong heat. When the part of the matter that was first put into the crucible is heated red hot, throw in the rest gradually and if the crucible will not contain the whole, pour part of the melted matter out on a moistened stone, or marble; and having made room in the crucible, put in the rest, and let it continue there likewise till it be red hot. Pour it out then as the other, and afterwards put the whole into an earthen, or very clean iron pot, with 10 pints of water, and heat it over the fire, till the salts be entirely melted. Let it then be taken off the fire, stand till it be cold, and afterwards filter it through paper in a pewter cullender. When it is filtered, return the fluid again into the pot, and evaporate the salt to dryness, which will then be as white as snow, the nitre having burnt all the phlogistic matter that remained in the pearl-ashes after their former calcination.

To polish optical glasses.

The operation of polishing optic glasses, after being properly ground, is one of the most difficult points of the whole process. Before the polishing is begun, it is proper to stretch an even well wrought piece of linen over the tool, dusting upon it some very fine tripoli. Then taking the glass in the hand, run it round forty or fifty times upon the tool, to take off the roughness of the glass about the border of it. This cloth is then to be removed, and the glass to be polished upon the naked tool, with a compound powder, made of four parts tripoli mixed with one of fine blue vitriol: six or eight grains of which mixture are sufficient for a glass five inches broad. This powder must be wetted with eight or ten drops of clear vinegar in the middle of the tool; being first mixed and softened thoroughly with a very fine small muller. Then, with a nice brush having spread this mixture thinly and equably upon the tool, take some very fine tripoli, and strew it thinly, and equably, upon the tool so prepared; after which, take the glass to be polished, wiped very clean, and apply it on the tool, and move it gently twice or thrice in a straight line backwards and forwards; then take it off, and observe whether the marks of the tripoli, sticking to the glass, are equably spread over the whole surface; if not, it is a sign that either the tool or glass is too warm; in which case wait awhile and try it again, till the glass takes the tripoli every where alike. Then begin to polish boldly, there being no danger of spoiling the figure of the glass, which in the other case would infallibly happen.

To purify pearl-ashes for the manufacture of mirrors.

Take any quantity of the best pearl-ashes, and dissolve them in four times their weight of water, boiling, which operation may be best performed in a pot of cast iron. When they are dissolved, let the solution be put into a clean tub, and suffered to remain there twenty-four hours or longer. Let the clear part of the fluid be then decanted off from the dregs or sediment, and put back into the iron pot, in which the water must be evaporated away till the salts be left perfectly dry again. They should then, if not used immediately, be kept in stone jars, well secured from moisture and air, till such time as they are wanted.

Great care should be always taken in this treatment of the salts, to keep the iron pot thoroughly clean from rust, which would give a yellow tinge to the glass, not to be removed without greatly injuring it.

GLASS AND PASTES TO IMITATE PRECIOUS STONES, &c.

The best and hardest glass for receiving colour. No. 1.

Take of the best sand, cleansed by washing, twelve pounds, of pearl-ashes, or fixed alkaline sal, purified with nitre, seven pounds, of salt-petre, one pound, and of borax, half a pound.

The sand being first reduced to powder in a glass or flint mortar, the other ingredients should be put to it, and the whole well mixed by pounding them together.

Best glass, but not so hard. No. 2.

Take of the white sand cleansed, twelve pounds, of pearl-ashes, purified with salt-petre, seven pounds, of nitre, one pound, of borax, half a pound, and of arsenic, four ounces.

Proceed as in the last, but if the glass be required to melt with yet less heat, a pound of borax may be used instead of the half pound, and a pound of common salt may be added; but this last is apt to make the glass more brittle, which is an injury done to such as is to be cut into very small pieces, and ground with so many angles in the figure, in imitation of jewels.

Soft glass or paste for receiving colour. No. 3.

Take of white sand cleansed, six pounds, of red lead, three pounds, of purified pearl-ashes, two pounds, and of nitre, one pound.

Proceed with the mixture as with the foregoing.

Glass or paste, softer than the above. No. 4.

Take of white sand, cleansed, 6 lbs. of red lead, and purified pearl-ashes, each 3 lbs. of nitre, 1 lb. of borax, half a pound, and of arsenic, 3 oz.

This is very soft and will fuse with a very gentle heat, but requires some time to become clear, on account of the arsenic. It may even be prepared and tinged in a common fire without a furnace, if the pots containing it can be surrounded by burning coals, without danger of their falling into it. The borax being a more expensive ingredient than the others, may be omitted where a somewhat greater heat can be applied, and the glass is not intended for very nice purposes; or a pound of common salt may be instituted in its place, but the glass will be more clear and perfect, and free itself much sooner from bubbles, where the borax is used.

This glass will be very soft and will not bear much water, if employed for rings, buckles, or such imitations of stones as are exposed to much rubbing. But, for ear-rings, ornaments worn on the breast, or such others as are but seldom put on, it may last a considerable time.

In all these soft compositions, care should be taken that part of the sand be not left unvitrified in the bottom of the pot, as will sometimes happen, for in that case the glass, abounding too much with salt and lead, will not bear the air, but being corroded by it, will soon contract a mistiness and specks on the surface, which will entirely efface all the lustre of the paste.

Hard glass of a full blue colour. No. 1.

Take of the composition of hard glass, No. 1 or 2, ten pounds, zaffre, 6 dr. and of magnesia, 2 dr. Proceed as with the above.

If this glass be of too deep a colour, the proportion of the zaffre and magnesia to the glass may be diminished; and if it verge too much on the purple, to which cast it will incline, the magnesia should be omitted. If a very cool or pure blue be wanted, instead of the magnesia, half an ounce of calcined copper may be used, and the proportion of zaffre diminished by one half.

Paste of a full blue colour. No. 2.

Take of the composition for paste, No. 1 or 2, ten pounds, and proceed as with the foregoing.

Hard glass resembling the sapphire. No. 3.

Take of the compositions for hard glass, No. 1 or 2, ten pounds, of zaffre, three drachms and one scruple, of calx caffei, or precipitation of gold, by tin, 1 dr. Proceed as with the above.

Cheaper hard glass for ditto. No. 4.

As the foregoing, only, instead of the precipitate of gold, use two drachms and two scruples of magnesia.

If this be well managed, the colour will be very good, and the glass, when set and cut, will not be easily distinguishable from the true sapphire; but the preceding will be a finer colour, as there is a foulness in the tinge of the magnesia, which will always diminish, in some degree, the effect of brighter colours, when with them.

Paste resembling the sapphire. No. 5.

Take of the composition for paste, No. 3 or 4, and proceed as with the foregoing.

It is not worth while to bestow the expense of colouring paste with the gold, and it is therefore more expedient, in the case of such, to use the other method.

Hard glass and paste for sapphire, by means of smalt. No. 6.

Take of the compositions for hard glass and paste, any quantity, and mix with them, one-eighth of their weight of smalt, the brightest and most inclining to purple that can be procured.

If it be desired to give a more purple tinge, magnesia may be added in the proportion required.

Hard glass resembling eagle marine. No. 7.

Take of the composition for hard glass, No. 1 or 2, ten pounds, of copper, highly calcined with sulphur, 3 oz. and of zaffre, one scruple. Proceed as with the foregoing.

Paste for eagle marine. No. 8.

Take of the composition for paste, No. 1 or 2, ten pounds, and proceed as with the above.

Hard glass of a gold or yellow colour. No. 1.

Take of the composition for hard glass, No. 1 or 2, ten pounds, but omit the salt-petre, and for every pound add an oz. of calcined borax, or, if that do not render the glass sufficiently fusible, 2 oz. of red tartar, the deepest coloured that can be procured, ten oz. of magnesia, 2 oz. of charcoal, of sallow or any other softer kind, 2 dr. Proceed as with the rest.

Paste of a gold or yellow colour. No. 2.

Take of the composition for paste, No. 3 or 4, prepared without the salt-petre, ten pounds, of iron, strongly calcined, 1 oz. and a half. Proceed as with the others.

The crude tartar and the charcoal must not be used where lead enters into the composition of the glass, and the nitre may be spared, because the yellow tinge, given to the glass by the lead, on account of which the nitre is used, is no detriment in this case, but only adds to the proper colour. This colour may also be prepared by crude antimony, as well as the calcined iron, but it is more difficult to be managed, and not superior in its effect.

Hard glass resembling the topaz. No. 3.

Take of the composition for hard glass, No. 1 or 2, ten pounds, and an equal quantity of the gold coloured hard glass. Powder and fuse them together.

As there is a great variety in the colour of topaz, some being a deeper yellow, and others slightly tinged, the proportions of the yellow-glass to the white may be accordingly varied at pleasure, the one here given being for the deepest.

Paste resembling the topaz. No. 4.

This may be done in the same manner as the preceding, but the salt-petre may be omitted in the original composition of the glass, and for the resemblance of the very slightly coloured topazes neither the gold coloured paste nor any other tinging matter need be added, that of the lead being sufficient, when not destroyed by the nitres.

Glass resembling the chrysolite. No. 5.

Take of the compositions for hard glass, No. 1 or 2, ten pounds, of calcined iron, 6 dr. Proceed as with the above.

Paste resembling the chrysolite. No. 6.

Take of the composition for paste, No. 3 or 4, prepared without salt petre, ten pounds, and of calcined iron, 5 dr. Proceed as with the rest.

Hard glass resembling the emerald. No 1.

Take of the composition for hard glass, No. 1 or 2, 9 lbs. of copper precipitated from aqua fortis, 3 oz. and of precipitated iron, 2 dr.

Paste resembling the emerald. No. 2.

Take of the composition for paste, No. 1 or 2, and proceed as with the above; but if the salt-petre be omitted in the preparation of the paste, a less proportion of the iron will serve.

Hard glass of a deep and very bright purple colour. No. 1.

Take of the composition for hard glass, No. 1 or 2, 10 lbs. of zaffre, 6 dr. of gold, precipitated by tin, 1 dr. Proceed as with the rest.

Hard glass of a deep purple colour. No. 2.

Take of the compositions for hard glass, No. 1 or 2, 10 lbs. of magnesia, 1 oz. and of zaffre, half an oz. Proceed as with the other.

Paste of a deep purple colour. No. 3.

Take of the composition for paste, No. 3 or 4, 10 pounds, and treat them as the foregoing.

Hard glass of the colour of the amethyst. No. 4.

Take of the composition of hard glass, No. 1 or 2, 10 pounds, of magnesia 1 oz. and a half, and of zaffre 1 dr. Proceed as with the rest.

Paste of the colour of the amethyst. No. 5.

Take of the composition for paste, No. 1 or 2, 10 pounds, and treat it as the preceding.

Paste resembling the diamond.

Take of the white sand 6 lbs. of red lead 4 lbs. of pearl ashes, purified as above directed, 3 lbs. of nitre, 2 lbs. of arsenic 5 oz. and of magnesia, 1 scruple. Proceed as with the others, but continue the fusion for a considerable time on account of the large proportion of arsenic.

If this composition be thoroughly vitrified, and kept free from bubbles, it will be very white, and have a very great lustre; but, if on examination it appears to incline to yellow, another scruple or more of the magnesia may be added. It may be rendered harder by diminishing the proportion of lead, and increasing that of the salts, or fusing it with a very strong fire; but the diminution of the proportion of lead will make it have less of the lustre of the diamond.

Hard glass perfectly black.

Take of the composition for hard glass, No. 1 or 2, 10 lbs. of zaffre, 1 oz. of magnesia, and of iron, strongly calcined, each 6 drachms. Proceed as with the rest.

Paste perfectly black.

Take of the composition for paste, No. 1 or 2, prepared with the salt-petre, 10 lbs. of zaffre 1 oz. of magnesia, 6 dr. and of iron, highly calcined, 5 dr. Proceed as with the others.

White opake glass. No. 1.

Take of the composition for hard glass, No. 1 or 2, 10 lbs. of horn, ivory, or bone, calcined perfectly white, 1 lb. Proceed as with the others.

Paste of an opake whiteness. No. 8.

Take of the composition, No. 3 or 4, 10 lbs. and make the same addition as to the above.

Glass of an opake whiteness formed by arsenic. No. 3.

Take of flint glass 10 pounds, and of very white arsenic, 1 pound. Powder and mix them thoroughly, by grinding them together, and then fuse them with a moderate heat till they be well incorporated, but avoid liquefying them more than to make perfect union.

This glass has been made at a considerable manufactory near London, in great quantities, and has not only been formed into a variety of different kinds of vessels, but, being very white and fusible with a moderate heat, has been much used, as a white ground, for enamel in dial plates, and other pieces which have not occasion to go several times into the fire to be finished. It will not, however, bear repeated burnings, nor a strong heat continued for any length of time, when applied to this purpose, without becoming transparent, to which likewise the smoke of a coal fire will also greatly contribute; but it answers the end very well in many cases, though even in those, enamel of the same degree of whiteness would be preferable, as this is always brittle, and of less firm and tenacious texture.

Hard glass, or paste, formed by calx of tin or or antimony. No. 4.

Take of any of the compositions for hard glass, or pastes, 10 pounds of calcined tin, (commonly called putty) or of antimony, or tin calcined by means of nitre, 1 lb. and a half; mix them well by grinding them together, and then fuse them with a moderate heat.

The glass of this kind made with the composition for pastes, differs in nothing from white enamel, but in the proportion of the calx of tin and antimony.

Semi-transparent white glass and paste resembling the opal. No. 5.

Take of any of the compositions for hard glass, or paste, 10 pounds, of horn, bone, or ivory, calcined to a perfect whiteness, half a a pound. Proceed as with the rest.

This white hard glass is much the same with the German glass formerly brought here in porringers, cream pots, vinegar cruets, and other such pieces, of which we frequently meet with the remains.

Fine red glass resembling the ruby. No. 1.

Take of the hard glass, No. 1 or 2, 1 pound, of the calx caffei, or gold prepared by precipitation with tin, 3 drachms. Powder the glass, and grind the calx of gold afterwards with it in a glass-flint, or agate mortar, and then fuse them together.

This may be made of a stronger or more diluted colour, by varying the proportion of the gold, in adjusting which, proper regard should be had to the application of the glass when made; for where this glass is set in rings, bracelets, or other close work, where foils can be used, a great saving may be made with regard to the colour of it, without much injury to the effect; but for ear-rings, or other purposes where the work is set transparent, a full strong colour should be given, which may be effected by the proportions directed in this composition.

Paste resembling the ruby. No. 2.

Take of the paste, No. 3 or 4, 1 lb. and of calx caffei, or precipitation of gold by tin, 2 drachms. Proceed in the mixture as with the above.

This will be equally beautiful with the above, and defective only in softness; but as that greatly takes away the value for some purposes, such as is appropriated to them may be tinged in a cheaper manner by the following means.

A cheaper paste resembling the ruby. No. 3.

Take of the composition for paste, No. 3 or 4, half a pound, of glass of antimony, half a pound, and of the precipitation of gold by tin, 1 drachm and a half. Proceed as with the others.

This will be considerably cheaper, and will have much the same effect, except that it recedes more from the crimson to the orange.

Hard glass resembling the garnet. No. 4.

Take of the composition for hard glass, No. 1 or 2, 2 pounds, of glass of antimony, 1 pound, of magnesia, and of the precipitate of gold by tin, each, 1 drachm.

This composition is very beautiful but too expensive, on account of the gold, for the imitation of garnets for common purposes, on which account the following may be substituted.

Hard glass resembling the garnet. No. 5.

Take of the composition, No. 1 or 2, 2 lbs., of the glass of antimony 2 lbs., and of magnesia 2 dr.

If the colour be found too dark and purple in either this or the preceding composition, the proportion of magnesia must be diminished.

Paste of the colour of garnet. No. 6.

Take of the composition for paste, No. 1 or 2, and proceed as with the above.

Hard glass resembling the vinegar garnet. No. 7.

Take of the composition, No. 1 or 2, two pounds, of glass of antimony 1 pound, of iron, highly calcined, half an ounce. Mix the iron with the uncoloured glass, and fuse them together till the mass be perfectly transparent, then add the glass of antimony, powdered, stirring the mixture with the end of a tobacco pipe, and continue them in the heat till the whole be perfectly incorporated.

Paste resembling the vinegar garnet. No. 8.

Take of the composition for paste, No. 3 or 4, and proceed as with the foregoing.

Fictitious or counterfeit lapis lazuli.

Take of any of the preceding compositions for hard glass, or paste, 10 pounds, of calcined bones, horn, or ivory, three quarters of a pound, of zaffre, 1 ounce. Fuse the uncoloured composition with the zaffre and magnesia, till a very deep transparent blue glass be produced. The mass being cold, powder it, and mix it with the calcined matter, by grinding them together. After which fuse them with a moderate heat till they be thoroughly incorporated, and then form the melted mass into cakes, by pouring it on a clean bright plate of copper or iron.

Another.

If it be desired to have it veined with gold, it may be done by mixing the gold powder, with an equal weight of calcined borax, and tempering them with oil of spike, by which mixture, the cakes being painted with such veins as are desired, they must be put into a furnace of a moderate heat, and the gold will be cemented to the glass as firmly as if the veins had been natural.

Another.

If the counterfeit lapis lazuli be desired of a lighter hue, the quantity of zaffre and magnesia must be diminished; or, if it be required to be more transparent, that of the calcined horn, bone, or ivory, should be lessened.

Another.

Instead of zaffre, where that cannot be obtained, a proper proportion of smalt may be substituted. And in all cases, indeed, it may be a more certain way to form the zaffre and vitrifying ingredients into glass alone, and then having powdered them with the calcined bones or horns, infuse them a second time, and make them into cakes in the manner directed; for the fluxing power of the ingredients of the glass is so retarded by the calcined bone or horn, that it may, in some cases, fail to act sufficiently on the zaffre to vitrify it perfectly.

To make glass resembling red cornelian.

Take of the composition for hard glass, No. 1 or 2, 2 pounds, of glass of antimony 1 pound, of the calcined vitriol, called scarlet oker, 2 oz. and of magnesia 1 dr.

Fuse the glass of antimony and magnesia with the other glass first together, and then powder them well, and mix them with the scarlet oker, by grinding them together, and afterwards fuse the mixture with a gentle heat, till they are incorporated; but the heat must not be continued longer than is absolutely required to form them into a vitreous mass.

If it be desired to have the composition more transparent, part of the red oker must be omitted.

Paste resembling the red cornelian.

Take of the composition for paste, No. 1 or 2, 2 pounds, and proceed as with the above.

Hard glass resembling white cornelian.

Take of the composition for hard glass, No. 1 or 2, 2 pounds, of yellow oker, well washed, 2 drachms, and of calcined bones, each 1 ounce. Mix them well by grinding them together, and fuse them with a gentle heat till the several ingredients be well incorporated in a vitreous mass.

Paste resembling white cornelian.

Take of the composition for pastes, No. 1 or 2, 1 pound, and proceed as with the foregoing.

Hard glass or paste resembling the turquoise stone.

Take of the composition for blue glass or paste, No. 7 or 8, (being those resembling the eagle marine) 10 pounds of calcined bone, horn, or ivory, half a pound. Powder and mix them well, and then fuse them in a moderate heat till they be thoroughly incorporated.

If the colour be not so deep as may be desired, a small proportion of smalt may be added.

Brown Venetian glass with gold spangles.

Take of the composition for hard glass, No. 2, and the composition for paste, No. 1, each five pounds, and of highly calcined iron, one ounce. Mix them well, and fuse them till the iron be perfectly vitrified, and have tinged the glass of a deep transparent yellow brown colour. Powder this glass, and add to it two pounds of glass of antimony, being powdered, and mix them well, by grinding them together. Take part of this mixture, and rub into it fourscore or one hundred leaves of the counterfeit leaf of gold, commonly called Dutch gold; and, when the parts of the gold seem sufficiently divided, mix the powder containing it with the other part of the glass. Fuse the whole then with a moderate heat, till the powder runs into a vitreous mass, fit to be wrought into any of the figures or vessels into which it is usually formed; but avoid a perfect liquefaction, because that destroys, in a short time, the equal diffusion of spangles, and vitrifies, at least, part of the matter of which they are composed, converting the whole into a kind of transparent olive-coloured glass.

MISCELLANEOUS RECEIPTS,

Not appertaining to the previous classification.

To make a road on Mc Adam's system.

Stone is to be procured in some form in almost every part of the country, and a road made of small broken stone to the depth of ten inches, will be smooth, solid, and durable.

The size of stones for a road should be that of a hen's egg, or half a pound weight. It must be in due proportion to the space occupied by a wheel of ordinary dimensions on a smooth level surface: this point of contact will be found to be longitudinally, about an inch: and every piece of stone put into a road, which exceeds an inch in any of its dimensions, is mischievous.

In repairing an old road no addition of materials is to be brought upon it, unless in any part it be found that there is not a quantity of clean stone equal to ten inches in thickness.

The stone already in the road is to be loosened up and broken, so as no piece shall exceed six ounces in weight. The road is then to be laid as flat as possible, a rise of three inches from the centre to the side is sufficient for a road thirty feet wide.

The stones when loosened in the road are to be gathered off by means of a strong heavy rake, with teeth two inches and a half in length, to the side of the road, and there broken, and on no account are stones to be broken on the road.

When the great stones have been removed, and none left in the road exceeding six ounces, the road is to be put in shape, and a rake employed to smooth the surface, which will at the same time bring to the surface the remaining stone, and will allow the dirt to go down.

When the road is so prepared, the stones that have been broken by the side of the road are then to be carefully spread on it—not to be laid on it in shovels-full, but scattered over the surface, one shovel-full following another, and spreading over a considerable space.

Only a small piece of road should be lifted at once; five men in a gang should be set to lift it all across: two men should continue to pick up and rake off the large stones, and to form the road for receiving the broken stone, the other three should break stone—the broken stone to be laid on as soon as the piece of road is prepared to receive it, and then break up another piece; two or three yards at one lift is enough.

The proportioning the work among the five men must of course be regulated by the nature of the road; when there are many very large stones, the three breakers may not be able to keep pace with the two men employed in lifting and forming, and when there are few large stones the contrary may be the case; in all this, the surveyor must judge and direct.

But, while it is recommended to lift and relay roads which have been made with large stone, or with large stone mixed with clay, chalk, or other mischievous materials, there are many cases in which it would be highly unprofitable to lift and relay a road, even if the materials should have been originally too large.

When additional stone is wanted on a road that has consolidated by use, the old hardened surface of the road is to be loosened with a pick, in order to make the fresh materials unite with the old.

The only proper method of breaking stones, both for effect and economy, is by persons sitting: the stones are to be placed in small heaps, and women, boys, or old men, past hard labour, must sit down with small hammers and break them, so as none shall exceed six ounces in weight.

Every road is to be made of broken stone, without mixture of earth, clay, chalk, or any other matter that will imbibe water, and be affected with frost; nothing is to be lain on the clean stone on pretence of binding; broken stone will combine by its own angles into a smooth solid surface that cannot be effected by vicissitudes of weather, or displaced by the action of wheels, which will pass over it without a jolt, and consequently without injury.

Flint makes an excellent road, if due attention be paid to the size; but, from want of that attention, many of the flint roads are rough, loose, and expensive.

Limestone, when properly prepared and applied, makes a smooth solid road, and becomes consolidated sooner than any other material; but from its nature is not the most lasting.

Whinstone is the most durable of all materials; and, wherever it is well and judiciously applied, the roads are comparatively good and cheap.

The pebbles of Shropshire and Staffordshire are of a hard substance, and only require a prudent application to be made good road materials.

To preserve milk.

Provide bottles which must be perfectly clean, sweet, and dry; draw the milk from the cow into the bottle, and as they are filled, immediately cork them well up, and fasten the corks with pack thread or wire. Then spread a little straw on the bottom of a boiler, on which place bottles with straw between them, until the boiler contains a sufficient quantity. Fill it up with cold water; heat the water, and as soon as it begins to boil, draw the fire, and let the whole gradually cool. When quite cold take out the bottles, and pack them with straw or saw-dust in hampers, and stow them in the coolest part of the house or ship. Milk preserved in this manner, although eighteen months in the bottles, will be as sweet as when first milked from the cow.

To make a domestic telegraph.

This instrument consists of two dials, divided in the same manner, the hands of which move at the same time. One of these dials is placed in the master's room; the other is placed where the servant is waiting. Each of the divisions, which can be multiplied at will, represent an order which is indicated by a letter, or by any other sign agreed-upon. The master places the hand of his dial upon the sign of the order which he wishes to transmit, and immediately the signal is repeated in the servant's room.

To construct barometers.

The tubes intended for barometers ought to be sealed hermetically on both ends, immediately after they are made at the glass-house, and to be kept in this state until they are fitted up. Without this precaution, they are apt to be sullied with dust, moisture, and other impurities, which is afterwards almost impossible to remove on account of the smallness of their diameters. When they are opened, which may be done with a file, care should be taken not to breathe into them, nor to wash them with spirit of wine, or other fluid, experience having proved that in tubes so treated, the mercury always stands a little below its proper level; this is owing to the adhesion of a little of the spirit of wine to the sides of the tube. When cleaning is necessary, it must be done with a fine linen rag, that has been previously well dried.

The tubes ought to be as perfectly cylindrical as possible, though, in some cases, this is not absolutely necessary. They should be about 33 inches in length, and the diameter of their bore should be at least 2 or 2 1-2 lines, otherwise the friction, and the capillary action, will be apt to affect the free motion of the mercury. The glass should not be very thick, as it is apt in that case to break, when the mercury is boiled in the tube: half a line is sufficient.

The mercury ought to be perfectly pure and free from all foreign metals. The best is what has been recently revived from cinnabar; the common mercury of the shops being often adulterated intentionally with tin, lead, and bismuth, stands at various heights in the tube, according to the nature and quantity of the foreign substances with which it is amalgamated.

To purify the mercury.

For this purpose, take a pound of cinnabar, and reduce it to powder: mix it well with five or six ounces of iron or steel filings; and having put the mixture into an iron retort, expose the whole to the heat of a reverberatory furnace; the mercury will soon pass over in a state of great purity, and may be obtained by adapting to the retort an earthen receiver, which has been previously half filled with water.

Process of filling the tube.

Before being well introduced into the tube, the mercury ought to be well heated, or even boiled in a glazed earthen pipkin; in order to drive off any moisture which may adhere to it, but this will be unnecessary if the mercury has been recently revived.

The mercury ought likewise to be boiled in the tube to expel any air or moisture which may still remain attached to it, or to the inside of the tube. This is done in the following manner: Pour as much mercury into the tube as will make it stand to the length of three or four inches; and introduce a long wire of iron to stir it during the boiling. Expose the mercury in the tube gradually to the heat of a chafing-dish of burning charcoal; and when it begins to boil, stir it gently with the iron wire, to facilitate the disengagement of the bubbles of the air. When the first portion of the mercury has been sufficiently boiled, and all the air extricated, remove the tube from the chafing-dish, and allow the whole to cool, taking care not to bring it into contact with any cold substance. Introduce an equal quantity of mercury, and treat it in the same manner, withdrawing the wire a little, so that it may not reach below the upper part of the mercury already freed from air. The chafing-dish must also be placed immediately under the mercury which has been last poured in. Repeat the same process with each successive portion of mercury, till the tube is filled, always applying the heat very cautiously: and be equally careful in allowing it to cool, before a fresh portion of mercury is poured in.

To construct Mr. Troughton's improved marine barometer.

The tube consists of two parts, joined together about five inches below the top: the bore in the upper part being about 4-10ths of an inch, and in the lower part only 2-100ths. By this construction, partly from the difference of the bores, and partly from the greater friction in the lower end, the motion of the mercury is so much retarded, that any impulse given by the ship, having a tendency to raise it, will scarcely have produced a sensible effect, before an opposite impulse will be given having a tendency to depress it. To counteract more effectually the effects of the ship's motions, the instrument is suspended in gymbals. The whole is attached to the side of the cabin by two tubes of brass, which slide one within the other, and render the instrument capable of being suspended at different distances from the place of support, that the bottom of it may not strike the sides of the cabin, during any heavy rolling of the vessel. The inner tube carries the gymbals. The external frame of the barometer is a cylindrical tube of wood, on which slides a brass socket; and in this is inserted the innermost pair of pivots of the gymbals, or universal joints, which furnishes the instrument with a moveable point of suspension. The top is terminated with a knob of brass, of a weight nearly equal to that of the mercury, &c. at the lower end. With respect to the position of the point of suspension, no general rule can be given. It is obvious, however, that though this point were accurately determined for one particular height of the mercury, it would not correspond to every other. By the ingenious contrivance of Mr. Troughton, of placing a knob at the top, as a counterpoise to the weight of the mercury, the centre of gravity of the whole will be about the middle; and if the instrument were of the same specific gravity throughout, the point of suspension that would produce the smallest oscillations in the mercury, would be about 1-3rd of the length of the instrument from the top, considering the lower part as a fixed point. But as this is not strictly the case, the point of suspension is best ascertained by experiment. The graduation is on two scales of ivory, about four inches long, for the reception of which, two opposite quarters of the cylindrical frame are crossed out through that length, their planes pointing towards the centre of the tube. The index is a very light one, and slides upon the glass tube without touching any other part. At the bottom is the usual screw, which pressing up the leather bag, prevents the mercury from moving when the instrument is carried from one place to another.

Fahrenheit's hydrometer.

This consists of a hollow ball, with a counterpoise below, and a very slender stem above, terminating in a small dish. The middle or half length of the stem is distinguished by a fine line across. In this instrument every division of the stem is rejected, and it is immersed in all experiments to the middle of the stem, by placing proper weights in the little dish above. Then as the part immersed is constantly of the same magnitude, and the whole weight of the hydrometer is known, this last weight added to the weights in the dish will be equal to the weight of fluids displaced by the instrument, as all writers on hydrostatics prove; and, accordingly, the specific gravities of the common forms of the tables will be had by the following proportion: As the whole weight of the hydrometer and its load, when adjusted in distilled water, is to the number of 1000, &c. so is the whole weight when adjusted in any other fluid to the number expressing its specific gravity.

As the operation of weighing equal quantities of corrosive volatile fluids, to determine their specific gravities, requires considerable attention and steadiness, and also a good balance, the floating instrument called the hydrometer has always been esteemed by philosophers, as well as men of business.

To construct Fahrenheit's thermometer.

Fahrenheit's thermometer consists of a slender cylindrical tube, and a small longitudinal bulb. To the side of the tube is annexed a scale divided into 600 parts, beginning with that of the severe cold experienced in Iceland in 1709, or that produced by surrounding the bulb of the thermometer with a mixture of snow or beaten ice, and sal ammoniac or sea salt. This is marked at the beginning of the scale with O: the point at which the mercury begins to boil, is conceived to show the greatest degree of heat, beat, and is made the limits of the scale. The distance between these two points is divided into 600 equal parts or degrees; and by trials it is found that the mercury stands at 32 of these divisions, when water just begins to freeze, or snow or ice just begins to thaw; it is therefore called the degree of the freezing point. When the tube is immersed in boiling water, the mercury rises to 212, which therefore, is the boiling point, and is just 180 degrees above the former or freezing point. However the present method of making the scale of these thermometers, which is the sort in most common use, is first to immerge the bulb of the thermometer in ice or snow, just beginning to thaw, and mark the place where the mercury stands, with the place where the mercury stands in the tube, which mark with the number 212, exceeding the former by 180; dividing, therefore, the intermediate space into 180 equal parts, will give the scale of the thermometer, and which may afterwards be continued upwards and downwards with pleasure.

To construct a common thermometer.

In this thermometer the whole bulb of quicksilver, when immerged in boiling water, is conceived to be divided into 100,000 parts; and from this one fixed point the various degrees of heat, either above or below it, are marked in those parts of the scale by the various contractions or expansions of the quicksilver, in all the imaginable varieties of heat; some make the integer 100,000 parts at freezing water, and from thence complete the condensations of the quicksilver in those parts; as all the common observations of the weather are thereby expressed by numbers increasing as the heat increases, instead of decreasing or counting the contrary way. However, it will not be very easy to determine exactly all the divisions from the alterations of the bulk of the contained fluid. And, besides, as glass itself is dilated by heat, though in a less proportion than quicksilver, it is only the excess of the dilatation of the combined fluid above that of the glass that is observed; and therefore if different kinds of the glass be differently affected by a given degree of heat, this will make the seeming difference in the dilatations of the quicksilver in the thermometers constructed on the Newtonian principle.

To adjust the fixed points of thermometers.

In adjusting the freezing as well as the boiling point, the quicksilver in the tube ought to be kept in the same heat as that in the ball. When the freezing point is placed at a considerable distance from the ball, the pounded ice should be piled to such a height above the ball, that the error which can arise from the quicksilver in the remaining part of the tube not being heated equally with that in the ball, shall be very small, or the observed point must be corrected on that account to the following table :—

Heat of the air.	Correction.
42°	,00087
52	,00174
62	,00261
72	,00348
82	,00435

The correction in the table is expressed in 1000 parts of the distance between the freezing point and the surface of the ice: e. g. if the freezing point stands seven inches above the surface of the ice and the heat of the room is 62, the point of 32° should be placed 7X 00261, or 018 of an inch lower than the observed point. A diagonal scale will facilitate this correction. In trying the heat of the liquors care should be taken that the quicksilver in the tube of the thermometer be heated to the same degree as that in the ball; or if this cannot be done conveniently, the observed heat should be corrected on that account.

Portable barometer.

This instrument consists in general of a tube of the usual length, passing through the upper parts of a wooden cistern, to which it is glued, and the bottom of which is made of leather. The tube being filled with mercury, which has been previously well purged of air, and placed in a proper position, the superfluous mercury descends into the cistern, and assumes a level in the tube corresponding with the weight of the external air. The surface of the mercury in the cistern is adjusted to the same level by a screw, which presses more or less against the flexible leather at the bottom, and raises or depresses it at pleasure. From the line of this level, which is called zero, the scale commences and is reckoned upwards to the height of about 32 inches; the actual divisions of the scale begin at about 15 inches.

To make portable glue.

Take one pound of the best glue, boil and strain it very clear; boil likewise four ounces of isinglass, put it in a double glue-pot, with half a pound of fine brown sugar, and boil it very thick; then pour it into moulds; when cold, cut and dry them in small pieces. This glue is very useful to draughtsmen, architects, &c. as it immediately dilutes in warm water, and fastens the paper without the process of damping.

To make glue that will resist moisture.

Dissolve gum sandarac and mastic, of each two ounces, in a pint of spirit of wine, adding about an ounce of clear turpentine. Then take equal parts of isinglass and parchment glue, made according to the directions in the preceding article, and having beaten the isinglass into small bits, and reduced the glue to the same state, pour the solution of the gums upon them, and melt the whole in a vessel well covered, avoiding so great a heat as that of boiling water. When melted, strain the glue through a coarse linen cloth, and then put it again over the fire, adding about an ounce of powdered glass.

This preparation may be best managed by

hanging the vessel in boiling water, which will prevent the matter burning to the vessel, or the spirit of wine from taking fire, and indeed it is better to use the same method for all the evaporations of nicer glues and sizes; but, in that case less water than the proportion directed, should be added to the materials.

Another method.

A very strong glue, that will resist water, may be also made by adding half a pound of common glue, or isinglass glue, to two quarts of skimmed milk, and then evaporating the mixture to the due consistence of the glue.

To make parchment glue.

Take one pound of parchment, and boil it in six quarts of water, till the quantity be reduced to one quart: strain off the fluid from the dregs, and then boil it again till it be of the consistence of glue.

The same may be done with glover's cuttings of leather, which make a colourless glue, if not burnt in the evaporation of the water.

A very strong compound glue.

Take common glue in very small or thin bits, and isinglass glue: infuse them in as much spirit of wine as will cover them, for at least twenty-four hours. Then melt the whole together, and, while they are over the fire, add as much powdered chalk as will render them an opaque white.

The infusion in the spirit of wine has been directed in the recipes given for glue; but the remark on the use of it in one of the preceding articles will hold good also in this, and the mixture may be made with water only.

To make compound glue.

Take very fine flour, mix it with white of eggs, isinglass, and a little yeast; mingle the materials; beat them well together; spread them, the batter being made thin with gum-water, on even tin plates, and dry them in a stove, then cut them out for use. To colour them, tinge the paste with Brazil, or vermilion for red: indigo or verditer, &c. for blue; saffron, tumeric, or gamboge, &c. for yellow.

To make isinglass glue.

This is made by dissolving beaten isinglass in water by boiling, and having strained it through a coarse linen cloth, evaporating it again to such a consistence, that, being cold, the glue will be perfectly hard and dry.

A great improvement is made in this glue by adding spirit of wine or brandy after it is strained, and then renewing the evaporation till it gains the due consistence.

To make isinglass size.

This may also be prepared in the manner above directed for the glue, by increasing the proportion of the water for dissolving it, and the same holds good of parchment size. A better sort of the common size, may be likewise made by treating cuttings of glovers' leather in the same manner.

To make flour paste.

Paste is formed principally of wheaten flour boiled in water till it be of a glutinous or viscid consistence. It may be prepared with those ingredients simply for common purposes; but when it is used by bookbinders or for paper hangings to rooms, it is usual to mix a fourth, fifth, or sixth of the weight of the flour of powdered resin; and where it is wanted still more tenacious, gum arabic, or any kind of size may be added.

To make chinese paste.

Mix together bullocks' blood and quick lime, in the proportion of 1 pound of the latter to 10 pounds of the former. It becomes a stiff jelly, in which state it is sold to the consumers, who beat it down with an addition of water, into a state sufficiently fluid for use.

To weld tortoise shell.

Provide a pair of pincers, the tongs of which will reach four inches beyond the rivet. Now file the tortoise-shell clean to a lap joint, carefully observing that there be no grease about it. Wet the joint with water; apply the pincers hot, following them with water, and the shell will be found to be joined, as if it were originally the same piece.

To make cement for metals.

Take of gum mastic, 10 grains,—rectified spirit of wine, 2 drachms. Add 2 ounces of strong isinglass glue, made with brandy, and 10 grains of the true gum ammoniac. Dissolve all together, and keep it stopped in a phial. When intended to be used, set it in warm water.

Mahogany coloured cement.

Melt together two ounces of bees' wax and half an ounce of Indian red, and a small quantity of yellow ochre, to bring it to the proper colour.

To make red sealing wax.

Take of shell-lac, well powdered, two parts, of resin and vermilion, powdered, each, 1 part. Mix them well together and melt them over a gentle fire, and when the ingredients seem thoroughly incorporated, work the wax into sticks. Where shell-lac cannot be procured, seed-lac may be substituted for it.

The quantity of vermilion may be diminished without any injury to the sealing wax, where it is not required to be of the highest and brightest red colour; and the resin should be of the whitest kind, as that improves the effect of the vermilion.

Black sealing wax.

Proceed as directed for the red wax, only instead of the vermilion substitute the best ivory black.

Green sealing wax.

Proceed as in the above; only, instead of vermilion, use verdigris powdered; or where the colour is required to be bright, distilled or crystals of verdigris.

Blue sealing wax.

As the above; only changing the vermilion for smalt well powdered; or, for a light blue, verditer may be used; as may also, with more advantage, a mixture of both.

Yellow sealing wax.

As the above; only substituting masticot;

or, where a bright colour is desired, turpeth mineral, instead of the vermilion.

Purple sealing wax.

As the red; only changing half the quantity of vermilion for an equal or greater proportion of smalt, according as the purple is desired to be bluer or redder.

Uncoloured soft sealing wax.

Take of bees' wax, 1 pound, turpentine, 3 oz. and olive oil, 1 oz.

Place them in a proper vessel over the fire, and let them boil for some time, and the wax will be then fit to be formed into rolls or cakes for use.

Red, black, green, blue, yellow, and purple, soft sealing wax.

Add to the preceding composition, while boiling, an ounce or more of any ingredients directed above for colouring the hard sealing-wax; and stir the matter well about, till the colour be thoroughly mixt with the wax.

The proportion of the colouring ingredients may be increased, if the colour produced by that here given be not found strong enough.

To cure smokey chimneys.

The common causes of smoky chimneys are either that the wind is too much let in above at the mouth of the shaft, or else that the smoke is stifled below: they may also proceed from there being too little room in the vent, particularly where several open into the same funnel. The situation of the house may likewise affect them, especially if backed by higher ground or higher buildings.

The best method of cure is to carry from the air a pipe under the floor and opening under the fire; or when higher objects are the cause, to fix a moveable cowl at the top of the chimney.

In regard to smoky chimneys, a few facts and cautions may be useful; and a very simple remedy may often render the calling in of masons and bricklayers unnecessary.

Observe that a northern aspect often produces a smoky chimney.

A single chimney is apter to smoke, than when it forms part of a stack.

Straight funnels seldom draw well.

Large fire-places are apt to smoke, particularly when the aperture of the funnel does not correspond in size; for this a temporary remedy may be found in opening a door or window—a permanent cure by diminishing the lower aperture.

When a smoky chimney is so incorrigible as to require a constant admission of fresh air into the room, the best mode is to introduce a pipe, one of whose apertures shall be in the open air, and the other under the grate; or openings may be made near the top of the apartment, if lofty, without any inconvenience even to persons sitting close by the fire.

This species of artificial ventilation will always be found necessary for comfort where gas is used internally, whether a fire is lighted or not.

Where a chimney only smokes when a fire is first lighted, this may be guarded against by allowing the fire to kindle gradually; or more promptly by laying any inflammable substance, such as shavings, on the top of the grate; the rapid combustion of which will warm the air in the chimney, and give it a tendency upwards, before any smoke is produced from the fire itself. If old stove-grates are apt to smoke, they may be improved by setting the stove further back. If that fails, contract the lower orifice.

In cottages, the shortness of the funnel or chimney may produce smoke; in which case the lower orifice must be contracted as small as possible by means of an upright register.

If a kitchen chimney overpowers that of the parlour, as is often the case in small houses, apply to each chimney a free admission of air, until the evil ceases.

When a chimney is filled with smoke, not of its own formation, but from the funnel next to it, an easy remedy offers in covering each funnel with a conical top, or earthen crock, not cylindrical but a fustrum of a cone; by means of which the two openings are separated a few inches, and the cold air, or the gusts of wind no longer force the smoke down with them.

If these remedies fail, it will be generally found that the chimney only smokes when the wind is in a particular quarter, connected with the position of some higher building, or a hill, or grove of trees. In such cases the common turncap, as made by tinmen, and ironmongers, will generally be found fully adequate to the end proposed. A case has occurred of curing a smoky chimney exposed to the N. W. wind, and commanded by a lofty building on the S. E. by the following contrivance.

A painted tin cap of a conical form was suspended by a ring and swivel, so as to swing over the mouth of the chimney-pot by means of an arched strap or bar of iron nailed on each side of the chimney. When a gust of wind laid this cap (which from its resemblance in form and use to an umbrella, is called a paravent or wind guard,) close to the pot on one side, it opened a wider passage for the escape of the smoke on the opposite side, whichever way the wind came; while rain, hail, &c. were effectually prevented from descending the flue.

To clean chimneys.

The top of each chimney should be furnished with a pot somewhat in the shape of a bell, underneath the centre of which should be fixed a pulley, with a chain of sufficient length for both ends to be fastened, when not in use, to nails or pins in the chimney, out of sight, but within reach from below. One or both of these ends should be adapted to the reception of a brush of an appropriate construction; and thus chimneys may be swept as often as desired, by servants, with very little additional trouble.

To extinguish a chimney on fire.

Shut the doors, and windows, throw water on the fire in the grate, and then stop up the bottom of the chimney.

Another method.

The mephitic vapour produced by throwing a handful of flour of sulphur on the burning coals, where a chimney is on fire, will immediately extinguish the flames.

To cure dry rot in timber.

Saturate the wood in a weak solution of copperas, for joists, beams, rafters, and floorings; or soak the wood in lime-water, suffering it to dry, and then apply water, in which there is a weak solution of vitriolic acid; or wash it with a strong solution of potash, then with pyroligneous acid, in which the oxyde of lead or iron has been dissolved; and finally, with alum water.

A current of air under a floor will always prevent the dry rot, and stop it when it has commenced.

In boarding kitchens and other rooms on the basement story, the planks should be steeped in a strong solution of vitriol, or alum, and when they are dried, the side next the earth should receive a coat of tar, or common paint.

To preserve polished irons from rust.

Polished iron-work may be preserved from rust by a mixture not very expensive, consisting of copal varnish intimately mixed with as much olive oil as will give it a degree of greasiness, adding thereto nearly as much spirit of turpentine as of varnish. The cast ironwork is best preserved by rubbing it with black-lead.

But where rust has begun to make its appearance on grates or fire irons, apply a mixture of tripoli, with half its quantity of sulphur, intimately mingled on a marble slab, and laid on with a piece of soft leather: or emery and oil may be applied with excellent effect; not laid on in the usual slovenly way, but with a spongy piece of the fig-tree fully saturated with the mixture. This will not only clean but polish, and render the use of whiting unnecessary.

To preserve brass ornaments.

Brass ornaments, when not gilt or lackered, may be cleaned in the same way, and a fine colour may be given to them by two simple processes. The first is to beat sal ammoniac into a fine powder, then to moisten it with soft water, rubbing it on the ornaments, which must be heated over charcoal, and rubbed dry with bran and whiting. The second is to wash the brass work with roche alum boiled in strong ley, in the proportion of an ounce to a pint; when dry it must be rubbed with fine tripoli. Either of these processes will give to brass the brilliancy of gold.

To remove unpleasant odours.

The unpleasant smell of new paint is best removed by time and atmospheric ventillation: but tubs of water placed in the apartment, will act more rapidly: with this inconvenience, however, that the gloss of the paint will be destroyed. Unpleasant smells from water-closets, or all articles of furniture connected with them, may be modified by the application of lime water, to which may be added the soap suds that have been used in washing, which neutralize the pungently offensive salts: a little quicklime put into a night chair will destroy all disagreeable effluvia.

Aromatic pastiles of the following composition may be burned with great success: take of camphor, flowers of benzoin, powdered charcoal, powdered cascarilla bark, powdered Turkey myrrh, and powdered nitre, each equal quantities; beat them with syrup sufficient to form a mass, and divide into pastiles of a conical shape. They may be mixed up with spirit of turpentine (the rectified oil) or any thing that is inflammable. Syrup does best, as it is most adhesive.

To ventilate rooms.

To ventilate a room, carry a tin pipe from its ceiling a yard above the top of the room, and another from the top through the floor, boring some holes in the boards.

To warm a carriage, or small apartment.

Convey into it a stone bottle of boiling water, or for the feet a single glass bottle of boiled water wrapped in flannel.

To prepare a cheap hortus siccus.

All the smaller plants should be expanded under water, in a plate, upon a piece of writing paper sunk to the bottom. In this state they will assume their natural form and position. The paper, with the plant upon it, must be withdrawn from the water gently; and the plant and paper afterwards placed betwixt two or three sheets of blotting paper, and pressed with a book or flat board. It is then to be laid up in a quire of blotting paper, under pressure, for a day or two, when, if dry, it may be placed permanently upon writing paper.

To romove bugs, &c.

The bedsteads ought to be taken down three or four times a year, the screws rubbed with pure oil, and a good manual cleaning given to all its parts. This plan, which has been slightly noticed under the general head of cleanliness, will render all poisonous mixtures unnecessary, besides saving all the trouble, filth, and expense consequent upon the use of those medicaments so much recommended by quacks, bug destroyers, &c.

To drive away, or prevent the approach of caterpillars.

Wrap up yellow or turpentine soap in paper, or place an open bottle containing spirits of turpentine within the wardrobe. But as the smell of the latter may be unpleasant, sprinkle bay leaves, or worm-wood, or lavender, or walnut leaves, or rue, or black peper in grains.

To preserve furs.

When laying up muffs and tippets for the summer, if a tallow candle be placed on or near them, all danger of caterpillars will be obviated.

Water-proof composition for leather or cloth.

The new patent water-proof composition consists of the following materials:—Boil six gallons of linseed oil, one pound and a half of rosin, four pounds and a half of red lead, litharge, or any other substances usually called dryers, together, till they acquire such a consistence as to adhere to the fingers in strings when cooled; then remove the mixture from the fire, and when sufficiently cooled, thin it to the consistence of sweet oil, with spirits of turpentine, of which it commonly takes six gallons. Leave it to settle for a day or two, pour off the liquid from the grounds, and intimately mix with it one pound and a half of ivory or lamp black, and one pound and a half of Prussian blue, ground in linseed oil. The composition is then ready to be used on any kind of leather or cloth. Stir up the liquid, and apply it with a brush till an even gloss is produced; hang up the material acted upon till the next day, taking care to leave the surface as even as possible, and proceed in the same manner till it has the desired appearance.

To preserve clothes.

As clothes when laid up for a time, acquire an unpleasant odour, which requires considerable exposure to the atmospheric air, it will be prevented by laying recently made charcoal between the folds of the garments; and even when the odour has taken place, the charcoal will absorb it.

To remove stains from mourning dresses.

Boil a good handful of fig leaves in two quarts of water till reduced to a pint. Bombazine, crape, cloth, &c. need only be rubbed with a sponge dipped in the liquor, and the effect will be instantly produced.

To clean gold lace.

Gold lace is easily cleaned and restored to its original brightness by rubbing it with a soft brush dipped in roche alum burnt, sifted to a very fine powder.

To clean china and glass.

The best material for cleaning either porcelain or glass ware is fuller's earth, but it must be beaten into a fine powder and carefully cleared from all rough or hard particles, which might endanger the polish of the brilliant surface.

To explore unventilated places.

Light some sheets of brown paper and throw into the well or cavern; also fix a long pipe to a pair of bellows and blow for some time into the place.

To avoid injury from bees.

A wasp or bee swallowed may be killed before it can do harm, by taking a tea spoonful of common salt dissolved in water. It kills the insect, and cures the sting. Salt at all times is the best cure for external stings; sweet oil, pounded mallows, or onions, or powdered chalk made into a paste with water, are also efficacious.

If bees swarm upon the head, smoke tobacco and hold an empty hive over the head, and they will enter it.

To raise water in all situations.

The finest springs may be formed by boring, which is performed in the simplest manner, by the mere use of an iron rod, forced into the earth by a windlass. The workmen in a few days get to a genuine spring of pure water, fit for every purpose. After the water is found, they merely put tin pipes down the aperture, and it preserves a fine stream which sometimes rises from four to five feet high.

To keep up sash windows.

This is performed by means of cork, in the simplest manner, and with scarcely any expense. Bore three or four holes in the sides of the sash, into which insert common bottle corks, projecting about the sixteenth part of an inch. These will press against the window frames, along the usual groove, and by their elasticity support the sash at any height which may be required.

To write for the use of the blind.

Let an iron pen be used, the point of which is not split. Blind persons writing without ink, and pressing on a strong paper, will produce characters in relief, which they can immediately read, by passing their fingers over the projecting characters, on the opposite side of the paper, in the contrary direction.

To freeze quicksilver.

Crystallized muriate of lime and snow may be used as frigorific ingredients for this purpose. Four ounces of mercury in a retort immersed in a mixture of snow and muriate of lime, the degree of cold being 50 degrees, were fixed, in an experiment, in fifteen minutes. In another experiment, the external temperature being 33 degrees, the quantity of 56 lbs. avoirdupoise, of mercury inclosed in a bladder, was completely fixed in the same mixture, in an hour and forty minutes.

To clean boots and shoes.

Good brushes and blacking are indispensably necessary. First remove all the loose dirt with a wooden knife, and never use a sharp steel one, as the leather is too often cut, and the boots and shoes spoiled. Then take the hard brush and brush off the remainder, and all the dust; they must also be quite dry before blacking or they will not shine. Do not put on too much blacking at a time, for, if it dries before using the shining brush, the leather will look brown instead of black. If there are boot-trees never clean either boots or shoes without them; but take care that the trees are always kept clean and free from dust. Never put one shoe within another: and when cleaning ladies' boots or shoes be careful to have clean hands, that the linings may not get soiled. Always stir the blacking up well before using it, put it on the brush with a piece of sponge tied to the end of a small cane, and keep it corked when done with it, as it gets spoiled by being exposed to the air. Always scrape off the dirt when wet from boots or shoes; but never place them too near the fire when dry, as that cracks the leather.

There are various ways of cleaning boot tops, in all cases, however, the tops are done the last; great care therefore is necessary that the bottoms do not get dirtied whilst the tops are doing. To prevent this, take a piece of parchment and cover the top part of the boot whilst the leg of it is cleaning, and afterwards the leg part whilst the top is cleaning. Directions for mixtures proper for this purpose, as also for rendering leather water-proof, and for making blacking, will be found by referring to the index.

To clean knives and forks.

Procure a smooth board, free from knots, or one covered with leather. If the latter, melt a sufficient quantity of mutton suet, and put it hot upon the leather with a piece of flannel; then take two pieces of soft Bath brick, and rub them one against the other over the leather till it is covered with the powder, which rub in until no grease comes through when a knife is passed over the leather, which may easily be known by the knife keeping its polish.

If only a plain board, rub the Bath brick two or three times over it; for if too much be put on at once it will make the blades of the knives look rough and scratched. Let the board be of a proper height, and set so that the person may be a little on the stoop while cleaning the knives. Take a knife in each hand, holding them back to back; stand opposite the middle of the board; lay the knives flat upon it, and do not bear too hard upon them; by this method it will be easier to clean two knives at a time than one, and they will be less liable to be broken, for good knives will snap when pressed on too heavily. Many will say that they cannot clean two knives at once, or that they can get through them faster one by one; but if they will only try it a few times in the way recommended, they will find it not only much more expeditious, but easier.

Be careful in keeping a good edge on the knives. Carving knives in particular ought to be kept sharp, which may easily be done by taking one in each hand, back to back when cleaning, scarcely letting them touch the board when expanding the arms, but when drawing the hands together again bearing a little hard on the edge of the knives; this will give them both a good edge and a fine polish, and is much better than sharpening them with a steel.

The best way to clean steel forks is to fill a small oyster barrel with fine gravel, brick-dust, or sand, mixed with a little hay or moss: make it moderately damp, press it well down, and let it always be kept damp. By running the prongs of the steel forks a few times into this, all the stains on them will be removed. Then have a small stick, shaped like a knife, with leather round it to polish between the prongs, &c. having first carefully brushed off the dust from them as soon as they are taken out of the tub. A knife board is often spoiled by cleaning forks upon it, and likewise the backs of the knives, to prevent this have a piece of old hat or leather put on the board where the forks and backs of the knives are cleaned.

Always turn the back of the knives towards the palm of the hand in wiping them, this will prevent all danger from cutting. In wiping the forks put the corner of the cloth between the prongs, to remove any dirt or dust that may not have been thoroughly brushed out; and if there should be silver ferules on the knives and forks, or silver handles, they must be rubbed, with a piece of leather and plate powder, keeping the blades covered while the handles are cleaning.

Wipe the knives and forks as soon as possible after being used, as the longer they are left with grease and stains on them the harder they will be to clean; particularly if they have been used for acids, salads, tarts, &c. have then a jug of hot water ready to put them into as soon as done with, and wipe them as before directed.

In order to keep knives and forks in good condition when they are not in use, rub the steel part with a flannel dipped in oil; wipe the oil off after a few hours, as there is often water in it; or dust the blades and prongs with quick lime, finely powdered, and kept in a muslin bag.

To clean plate and plated articles.

The plate ought to be free from grease; wash it, therefore, in boiling water, and if it have rough edges, brush it well before beginning to clean it. The leathers should be soft and thick; the sponge well soaked in water before using it. Use the plate powder, or whiting, either wet or dry; if wet do not put it on too much plate at once: rub it, if plain, with the bare hand; small articles, such as spoons and forks, can be done between the finger and thumb. The longer plate is rubbed the better it will look; when done enough brush the whiting or powder from out of the crevices and crests of the plate, and from between the prongs of the forks very carefully. Be careful also not to rub the salt and tea spoons and other small articles too hard, lest they should break or bend. Keep a clean leather to finish rubbing the plate with, after it is brushed, and let it be dusted with a linen cloth before it is put upon the table.

Plated articles require even more care than silver ones; they should be cleaned with soft brushes, not too often, and never with any thing but plate powder, not even whiting by itself; do not wet them more than can be helped or they will tarnish; nor brush them more than is necessary, or the silver will come off; the best thing for them is spirit of wine or oil, and take care that no plated articles remain long dirty or damp, for if they do they will rust, in case they are plated on steel, and canker if plated on copper.

Wash the brushes after the plate is cleaned with warm water and soap, do them quickly, and then set them to dry, with the wooden side uppermost, as that takes the most drying, and the bristles are apt to come out if the wood remain long wet.

To trim and clean lamps.

If they only want cleaning, pour in boiling water, with a little pearl ash, and shake it well: if the gummy part will not come away, scrape it carefully off, with a wooden or steel knife; then take the lamp to pieces and clean every part thoroughly. There are generally two or three small holes in the common brass lamps, to admit the air; be particular in keeping them open with a pin, or a piece of wire, as otherwise the lamp will smoke, and not give a good light.

The patent lamps are more difficult to clean. Take them entirely to pieces and use nothing but boiling water and pearl-ash. When the pan which holds the oil is thoroughly washed, wipe it quite dry with an old cloth, and put it upside down near the fire to take off the damps; let every other part be done the same Flannel and soap are best to use for the outside of the lamp. Be careful in cleaning the chimneys of the patent lamps; and also that part which receives the droppings of oil; for if they are not kept clean and free for the air to go through the lamp will never burn well.

Keep the cottons always clean and dry as well as the stick to put them on. Choose them of a fair thickness; not loose, but tight woven, firm and cut even: do not get too much oil at once, as it loses its goodness by keeping. Cut the cottons even, and fill the lamps with oil when trimming them; but not so as to run over. When fresh cottons are put in let the oil down, so that they may get well soaked, after which put up the part that keeps the oil up. Have a tin pot with a long spout to put the oil in with, to prevent spilling. Clean the glass with a damp sponge dipped in whiting; rub it well, but not hard, with a cloth or soft leather, and finish it with a clean linen cloth, or silk handkerchief. If the brass part of the glass lamp wants cleaning, use soap and flannel, and let them all be dusted every day, before lighting them. If the patent lamps be lighted up every evening, they should be emptied once a week; do not put the oil that comes from them into the jar with the best oil, but keep it separate to burn in the common lamps.

In cold weather warm the oil, by putting the lamps near the hall fire, just before lighting them: but be careful in carrying them about the house, for fear of spilling the oil. When lighting them do not raise the cotton up too high or too quickly, so as to smoke or crack the glasses. In frosty weather in particular, the glasses are very easily broken by a sudden transition from cold to heat. Raise the cottons therefore, gradually, and let the glass get warm by degress. Use wax-tapers, or matches without brimstone for lightning them; but not paper. If any doubt arises as to the lamps burning well, light them a little before they are wanted.

To clean candlesticks and snuffers.

If silver or plated, care must be taken that they are not scratched in getting off the wax or grease: therefore never use a knife for that purpose, nor hold them before the fire to melt the wax or grease, as in general the hollow part of the candlesticks, towards the bottom, is filled with a composition that will melt if made too hot. Pour boiling water over them; this will take all the grease off without injury, if wiped directly with an old cloth, and save the brushes from being greased: let them in all other respects be cleaned like the rest of the plate.

If japanned bed-room candlesticks, never hold them near the fire, or scrape them with a knife; the best way is to pour water upon them just hot enough to melt the grease; then wipe them with a cloth, and if they look smeary, sprinkle a little whiting, or flour upon them, and rub it clean off.

Be very particular in cleaning the patent snuffers, as they go with a spring, and are easily broken. The part which shuts up the snuffing has in general a small hole in it, where a pin can be put, to keep it open while cleaning it; be sure to have them well cleaned, that the snuff may not drop about when using them. The extinguishers likewise must be well cleaned in the inside, and be put ready with the snuffers, that the candlesticks may not be taken up without them.

If the sockets of the candlesticks be too large for the candles, put a piece of paper round the end, but do not let it be seen above the nozzle of the candlestick. Be particular in putting them in straight, and having clean hands, that they may not be dirtied. Always light the candle to burn off the cotton, before setting them up, but leave the ends long enough to be lighted again with ease, when wanted.—*Footman's Directory.*

To clean furniture.

Keep the paste or oil in a proper can or jar, that there may be no danger of upsetting when using it. Have two pieces of woollen cloth, one for rubbing it on, the other for rubbing it dry and polishing; also an old linen cloth to finish with, and a piece of smooth soft cork to rub out the stains: use a brush if the paste be hard. Always dust the table well before the oil or paste is put on; and if it should be stained, rub it with a damp sponge, and then with a dry cloth. If the stain does not disappear rub it well with a cork or a brush, the way the wood grows, for if rubbed cross-grained, it will be sure to scratch it. Be careful to keep the cork and brush free from dust and dirt. When the dust is cleaned off and the stains have been got out, put on the oil or paste, but not too much at a time; rub it well into the wood; if oil, be as quick as possible in rubbing it over the table and then polish it with another woollen cloth. If wax, put a little bit on the woollen cloth, with the finger, or a small stick; rub it well with this till the table has a high polish, then have another cloth to finish it with. Be very careful to have the edges of the tables well cleaned, and the oil and wax well rubbed off.

The furniture which is not in constant use will not require to be oiled above once a week: it ought however, to be dusted every day and well rubbed. Tables which are used daily must be well rubbed every morning, and great care should be taken to remove all spots from them, particularly ink: this can be done, if not left to dry long, by putting on a little salt of lemons with the finger.

When cleaning tables or chairs, be careful to remove them into the middle of the room, or at a distance from the wall. If the sideboard, or side-table is fixed to the wall, be still more careful in cleaning it, and roll up the woollen cloth tight in the hand, and into a small compass.

To clean looking-glasses, mirrors, &c.

If they should be hung so high that they cannot be conveniently reached, have a pair of steps to stand upon; but mind that they stand steady. Then take a piece of sponge, well washed and cleaned from every thing gritty, just dip it into water and squeeze it out again, and then dip it into some spirit of wine. Rub it over the glass; dust it over with some powder blue, or whiting sifted through muslin; rub it lightly and quickly off again, with a cloth: then take a clean cloth, and rub it well again, and finish by rubbing it with a silk handkerchief.

If the glass be very large, clean one half at a time, as otherwise the spirit of wine will dry before it can be rubbed off. If the frames are not varnished, the greatest care is necessary to keep them quite dry, so as not to touch them with the sponge, as this will discolour or take off the gilding.

To clean the frames, take a little raw cotton in the state of wool, and rub the frames with it; this will take off all the dust and dirt without injuring the gilding. If the frames are well varnished, rub them with spirit of wine, which will take out all spots, and give them a fine polish. Varnished doors may be done in the same manner. Never use any cloth to frames, or drawings, or unvarnished oil paintings, when cleaning and dusting them.

To brush clothes.

Have a wooden horse to put the clothes on, and a small cane to beat the dust out of them; also a board or table long enough for them to put their whole length when brushing them. Have two brushes, one a hard bristle the other soft; use the hardest for the great coats, and for the others when spotted with dirt. Fine cloth coats should never be brushed with too hard a brush, as this will take off the nap, and make them look bare in a little time. Be careful in the choice of the cane; do not have it too large, and be particular not to hit too hard; be careful also not to hit the buttons, for it will scratch if not break them; therefore a small hand-whip is the best to beat with.

If a coat be wet and spotted with dirt, let it be quite dry before brushing it; then rub out the spots with the hands, taking care not to rumple it in so doing. If it want beating, do it as before directed; then put the coat at its full length on a board; let the collar be towards the left hand, and the brush in the right: brush the back of the collar first, between the two shoulders next, and then the sleeves, &c. observing to brush the cloth the same way that the nap goes, which is towards the skirt of the coat. When both sides are properly done, fold them together; then brush the inside, and last of all the collar.

To take out greese from clothes.

Take off the grease with the nail, or if that cannot be done, have a hot iron with some thick brown paper; lay the paper on the part where the grease is, then put the iron upon the spot; if the grease comes through the paper, put on another piece, till it does not soil the paper. If not all out, wrap a little bit of cloth or flannel round the finger, dip it into spirit of wine, and rub the grease spot; this will take it entirely out. Be careful not to have the iron too hot; try it first on a piece of white paper; if it turn the paper brown, or scorch it in the least, it is too hot. If paint should get on the coats, always have spirit of wine or turpentine ready, this with a piece of flannel cloth will easily take it off, if not left to get quite dry.

To pack china or glass.

Procure some soft straw or hay to pack them in, and if they are to be sent a long way, and are heavy, the hay or straw should be a little damp, which will prevent them slipping about. Let the largest and heaviest things be always put undermost in the box or hamper. Let there be plenty of straw, and pack articles tight; but never attempt to pack up glass or china which is of much consequence, till it has been seen done by some one used to the job. The expense will be but trifling to have a person to do it who understands it, and the loss may be great if articles of such value are packed up in an improper manner.

To clean wine decanters.

Cut some brown paper into very small bits, so as to go with ease into the decanters; then cut a few pieces of soap very small, and put some water, milk-warm, into the decanters, upon the soap and paper; put in also a little pearl-ash; by well working this about in the decanters, it will take off the crust of the wine and give the glass a fine polish. Where the decanters have been scratched, and the wine left to stand in them a long time, have a small cane with a bit of sponge tied tight at one end; by putting this into the decanters any crust of the wine may be removed. When the decanters have been properly washed, let them be thoroughly dried, and turned down in a proper rack.

If the decanters have wine in them, when put by, have some good corks always at hand to put in instead of stoppers; this will keep the wine much better.

To decant wine.

Be careful not to shake or disturb the cruet when moving it about or drawing the cork, particularly Port wine. Never decant wine without a wine strainer, with some fine cambric in it to prevent the crust and bits of cork going into the decanter. In decanting Port wine do not drain it too near; there are generally two-thirds of a wine glass of thick dregs in each bottle, which ought not to be put in; but in white wine there is not much settling; pour it out however slowly, and raise the bottle up gradually; the wine should never be decanted in a hurry, therefore always do it before the family sits down to dinner. Do not jostle the decanters against each other when moving them about, as they easily break when full.

To clean tea-trays.

Do not pour boiling water over them, particularly on japanned ones, as it will make the varnish crack and peel off; but have a sponge wetted with warm water and a little soap if the tray be very dirty, then rub it with a cloth; if it looks smeary, dust on a little flour, then rub it with a dry cloth. If the paper tray gets marked, take a piece of woollen cloth, with a little sweat oil, and rub it over the marks, if any thing will take them out this will. Let the urn be emptied and the top wiped dry, particularly the outside, for if any wet be suffered to dry on it will leave a mark.

To wash and clean gentlemen's gloves.

Wash them in soap and water till the dirt is got out, then stretch them on wooden hands, or pull them out in their proper shape. Never wring them, as that puts them out of form, and makes them shrink; put them one upon another and press the water out. Then rub the following mixture over the outside of the gloves. If wanted quite yellow, take yellow ochre; if quite white, pipe clay; if between the two, mix a little of each together. By proper mixture of these any shade may be produced. Mix the colour with beer or vinegar.

Let them dry gradually, not too near the fire nor in too hot a sun; when they are about half dried rub them well, and stretch them out to keep them from shrinking, and to soften them. When they are well rubbed and dried, take a small cane and beat them, then brush them; when this is done, iron them rather warm, with a piece of paper over them, but do not let the iron be too hot.

To warm beds.

Take all the black or blazing coals out of the pan, and scatter a little salt over the remainder: this will prevent the smell of sulphur, so disagreable to delicate persons.

To bring horses out of a stable on fire.

Throw the harness or saddles to which they may have been accustomed, over the backs of the horses in this predicament, and they will come out of the stable as tractably as usual.

To manage water pipes in winter.

When the frost begins to set in, cover the water pipes with hay or straw bands, twisted tight round them. Let the cisterns and water-butts be washed out occasionally; this will keep the water pure and fresh.

In pumping up water into the cistern for the water-closet, be very particular, in winter-time, as in general the pipes go up the outside of the house. Let all the water be let out of the pipe when done pumping; but if this is forgotten, and it should get frozen, take a small gimblet and bore a hole in the pipe, a little distance from the place where it is let off, which will prevent its bursting. Put a peg into the hole when the water is let off. Pump the water up into the cistern for the closet every morning, and once a week take a pail of water, and cast it into the basin, having first opened the trap at the bottom; this will clear the soil out of the pipe.

To extract lamp-oil out of stone or marble halls, &c.

Mix well together a pint of strong soap lees, some fuller's earth well dried and a little pipeclay, pounded fine; and lay it on the part which is oiled; then put a hot iron upon it till dry. If all the oil should not come out the first time, do it again; and in putting it on, let it be well rubbed into the stone. By doing it two or three times in this way, it will come out.

To get oil out of boards.

Mix together fuller's earth and soap lees, and rub it into the boards. Let it dry and then scour it off with some strong soft soap and sand, or use lees to scour it with. It should be put on hot, which may easily be done, by heating the lees.

To preserve hats.

Hats require great care or they will soon look shabby. Brush them with a soft camel-hair brush, this will keep the fur smooth. Have a stick for each hat to keep it in its proper shape, especially if the hat has got wet; put the stick in as soon as the hat is taken off, and when dry put it into a hat-box, particularly if not in constant use, as the air and dust soon turn hats brown. If the hat is very wet, handle it as lightly as possible; wipe it dry with a cloth, or silk handkerchief; then brush it with the soft brush. If the fur sticks so close when almost dry, that it cannot be got loose with the soft brushes, then use the hard ones; but if the fur still sticks, damp it a little with a sponge dipped in beer or vinegar; then brush it with a hard brush till dry.

To make gas from coal-tar.

It has been found by experiment, that the coal-tar liquor, which is sometimes considered as waste by those who make gas, if mixed with dry saw-dust, exhausted logwood, or fustic, to the consistency of paste, and allowed to remain till the water has drained off; two cwt. of the mass, being put into the retort instead of coal, will produce more gas, and be less offensive.

To walk on water.

An exhibition called walking on water, has been exhibited by Mr. Kent at Glasgow. The apparatus is represented in an engraving; where a. b. c. are three hollow tin cases, of the form of an oblong hemispheroid, connected together by three iron bars, at the meeting of which is a seat for the exhibitor. These cases, filled with air, are of such magnitude that they can easily support his weight, and as a. b. and a. c. are about ten feet and b. c. about eight feet, he floats very steadily upon the water. The feet of the exhibitor rest on stirrups, and he attaches to his shoes, by leather belts, two paddles, d. e. which turn on a joint when he brings his foot forward to take the stroke, and keep a vertical position when he draws it back against the resisting water; by the alternate action of his feet he is thus enabled to advance at the rate of five miles an hour.—*Monthly Mag.*

To obtain the fragrant essences from the fresh rinds of citrons, oranges, &c.

Procure as many fresh citrons as will supply the required stock of essence; after cleaning off any speck in the outer rinds of the fruit, break off a large piece of loaf sugar and rub the citron on it till the yellow rind is completely absorbed. Those parts of the sugar which are impregnated with the essence are from time to time to be cut away with a knife, and put in an earthen dish. The whole being thus taken off, the sugared essence is to be closely pressed, and put in pots; where it is to be squeezed down hard; have a bladder over the paper by which it is covered, and tied tightly up. It is at any time fit for use, and will keep for many years. [Exactly in the same manner may be obtained and preserved, at the proper seasons, from the fresh roots, the essences of the rinds of Seville oranges, lemons, bergamots, &c.] This mode of extracting and preserving these essences is superior to the common practices of peeling, rasping, or grating of the rind, and afterwards mixing it up with powdered sugar, &c.

To ascertain the proportion of alcohol in wines, beer, cider, and other spirituous liquors.

To 100 parts in volume of the liquid to be tried, add 12 parts of the solution of sub-acetate of lead: (prepared as directed below:) a precipitation ensues, which by a slight agitation is rendered general. On filtering, a colourless liquid containing the alcohol is procured. By mixing with this dry and warm carbonate of potass, (calcined pearl-ash) as long as it is dissolved, the water is separated from the alcohol. The latter is seen floating above in a well marked stratum: the quantity of which can be estimated at once, in a measure tube.

To prepare the solution of sub-acetate of lead.

Boil 15 parts of pulverized (and calcined) litharge, with 10 of acetate of lead, in 200 of water, for 20 minutes, and concentrate the liquid by slow evaporation to one half; it must be kept in well-corked phials, quite full.

To determine whether wheat flour, or bread be adulterated with chalk.

Mix with the flour to be tried, a little sulphuric acid; if chalk or whiting be present, an effervescence (arising from the discharge of the carbonic acid of the chalk) will take place; but if the flour be pure, no effervescence is produced.

Another method.

Pour boiling water on some slices of bread, and then pour into the water a little sulphuric acid; if there be any chalk in the bread, an effervescence will ensue as before; but if none be in it, no effervescence will take place.

Chemical tests for gold.

To a diluted colourless solution of nitro-muriate of gold add a few drops of a solution of any salt of tin—or stir the solution of gold with a slip of metallic tin; in either case, the production of a beautiful purple or port wine colour will be the immediate result.—If the mixture is allowed to settle, it becomes colourless, a purple powder (which is an oxide of gold combined with a little tin) being precipitated. This powder is employed in the painting of China, and is called the purple precipitate of Cassius.

For silver.

Let fall a drop of a solution of nitrate of silver into a glassful of water, and add to it a grain of common salt—Mutual decomposition of the salts will take place, and muriate of silver (in the form of a white powder) will be precipitated.

For copper.

Add a few drops of a solution of nitrate of copper to a test glass of water—the mixture will be colourless; pour into it a little liquid ammonia—the mixture will then assume a fine deep blue colour.

To preserve pictures from decay.

To strengthen a decayed canvas and to preserve sound canvas from decaying, let the back of every picture receive two or three good thick coats of white lead, or whatever other cheap pigment is most recommendable for tenacity and strength. In pictures which may henceforth be produced, every painter should take care to have his canvas well backed with a strong coating of paint, previously to its being nailed to the frame, to secure it in every part from damp, mould, and mildew. In consequence of this precaution, his piece may be preserved one or two centuries longer than any other contemporary pictures whose backs are naked canvas.

To prepare soda water.

Soda water is prepared (from powders) precisely in the same manner as ginger beer, except that, instead of the two powders there mentioned, the two following are used: for one glass 30 grains of carbonate of soda, for the other 25 grains of tartaric (or citric) acid.

To prepare ginger beer powders.

Take 2 drachms of fine loaf sugar, 8 grains of ginger, and 26 grains of carbonate of potass, all in fine powder; mix them intimately in a Wedgwood's ware mortar. Take also 27 grains of citric or tartaric acid, (the first is the pleasantest but the last the cheapest). The acid is to be kept separate from the mixture. The beer is prepared from the powders thus: take two tumbler glasses, each half filled with water, stir up the compound powder in one of them, and the acid powder in the other, then mix the two liquors, an effervescence takes place, the beer is prepared and may be drank off.

The effervescence is occasioned by the discharge of the carbonic acid of the carbonate of potass. If the beer is allowed to stand for a few minutes it becomes flat, this is owing to its having lost all its carbonic acid. The cost of these powders is eight-pence a dozen sets.

To determine whether water be hard or soft.

To ascertain whether or not water be fit for domestic purposes, to a glassful of the water add a few drops of the solution of soap in alcohol. If the water be pure it will continue limpid, if impure, white flakes will be formed.

To detect copper in pickles or green tea.

Put a few leaves of the tea, or some of the pickle, cut small, into a phial with 2 or 3 dr. of liquid ammonia, diluted with one half the quantity of water. Shake the phial, when, if the most minute portion of copper be present, the liquid will assume a fine blue colour.

To make patent cement.

A mixture of lime, clay, and oxide of iron, separately calcined and reduced to fine powder, are to be intimately mixed. It must be kept in close vessels and mixed with the requisite quantity of water when used. This cement is useful for coating the joinings of the wood of which the pneumatic trough is composed, in order to render it water tight; and for other purposes of a like nature.

To preserve phosphorus.

Keep it in places where neither light nor heat has access. It is obtained from druggists in rolls about the thickness of a quill; these are put into a phial filled with cold water, which has been boiled to expel air from it, and the phial is inclosed in an opaque case.

To make gunpowder.

Pulverize separately 5 drachms of nitrate of potass, 1 of sulphur, and 1 of newly burnt charcoal. Mix them together with a little water in a mortar, so as to make the compound into a dough, which must be rolled out into round pieces the thickness of a pin, between two boards. Lay a few of these pieces together and cut them with a knife into small grains, which are to be placed on a sheet of paper in a warm place to dry. During granulation the dough must be prevented sticking to the board by rubbing on it a little of the dry compound powder. The explosion takes place in consequence of the generation of a large quantity of various gases.

To produce instantaneous light.

Put a little phosphorus, dried on blotting paper, into a small phial, heat the phial by placing it in a ladle of hot sand, and turn it round so that the melted phosphorus may adhere to its sides. Cork the phial closely and it is prepared.

Another.

Mix one part of flower of sulphur with eight parts of phosphorus. On putting a common sulphur match into this fire bottle, stirring it about a little and then withdrawing it into the air it will take fire. Sometimes, however, it is found necessary to rub the match, when withdrawn from the phial, on a cork before it will inflame.

Instantaneous light boxes.

The liquid is concentrated sulphuric acid. The bottle containing it is never opened except when it is to be used; for the acid, when exposed to the air, imbibes moisture very rapidly and is soon spoiled. The matches are prepared as follows:—the ends of some small slips of light wood are dipped into a strong solution of gum, and afterwards into the mixture of chlorate of potass and sulphur, prepared by rubbing 2 grains of the former into a fine powder in a mortar, and adding 1 grain of flowers of sulphur, then mixing them very accurately by well triturating them in the gentlest possible manner.

The powder is fastened to the wood by the gum, and the matches when dry are fit for use. Then take one and dip it into the liquid, upon which it takes fire.

Curious mode of silvering ivory.

Immerse a small slip of ivory in a weak solution of nitrate of silver, and let it remain till the solution has given it a deep yellow colour; then take it out and immerse it in a tumbler of clear water, and expose it in the water to the rays of the sun. In about three hours the ivory acquires a black colour; but the black surface, on being rubbed, soon becomes changed to a brilliant silver.

To make ink for printing on linen with types.

Dissolve 1 part of asphaltum in four parts of oil of turpentine, and add lamp-black, or black-lead, in fine powder, in sufficient quantity to render the ink of a proper consistence for printing with types.

To estimate the distance or danger of a thunder-cloud.

From a knowledge of the velocity with which sound travels, the distance of a thunder-cloud, or of a gun fired on board a ship at sea, even in the night time may be very accurately deduced. In the first case, the period of time between seeing the lightning and hearing the thunder must be taken, and if a stop-watch, or pendulum, are not at hand, the pulse may be used; for the pulsation of a healthy adult approach so near to seconds, that in the time of four or five of them no very sensible error can arise. Multiply the number by 1142 feet, the distance through which sound moves in a second.

Improved method of binding school-books.

When the books have been cut, coloured, and backed, cut off the part of the bands intended to be laced to the pasteboards, and glue on the back a piece of strong smooth linen cloth, which must reach within half an inch of the head and foot, turning on the sides about an inch: paste the boards on each side of the cloth, fixing them close in at the groove, and give the books a firm pressing in the standing press till dry. Square the boards, glue the backs, and cover and finish the books in the usual manner.

This method will secure and give strength to the joints, so as effectually to prevent the leather from breaking, and require no more time than lacing in the bands. The edge may now be coloured, sprinkled, or marbled, as required.

To cover books with leather.

Immerse the leather in water; after which wring it, and stretch it on a board; place the book with the boards extended thereon, and cut out the cover allowing about half an inch larger than the book, to turn over the inside of the pasteboards. Pare the edge of the cover very thin all round, on a marble slab, and paste it well; glue the back of the book, and spread the cover on the board.

Let the pasteboards be properly squared and even; put the book on the cover which draw on very tight. Rub the cover smooth with a folding stick, and turn it over on the inside of the pasteboards on the fore edge. The corners on the inside must be cut and neatly pressed down; tie a piece of thread round the book, between the boards and the head-bands, draw up the leather on the back, if necessary, to cover the top of the headbands; rub the back very smooth with a flat folding stick, and place it at a distance from the fire to dry.

Rough calf must be damped on the grain side with a sponge and water before pasting and covering.

Russia leather must be well soaked in water for an hour, taken out, well beaten, and rubbed; after which the paste must be well worked into the flesh side before covering.

Morocco must be grained by rubbing it on a board, with the grain side inside, and after being pasted, left to soak for a quarter of an hour, and the cover to be drawn on with a piece of woollen cloth to preserve the grain.

Roan may be either soaked in water or left to soak when pasted.

Half bound books.

These must be forwarded in boards, the half cover and corners well pared on the edges, tied round tne head-bands, and before putting on the marble paper, the edges must be burnished.

All whole-bound books should be pressed between two pressing boards of the same size, to make the cover more smooth, and to give the joints neatness at the back.

To preserve cabbages and other esculent vegetables fresh during a sea voyage, on a severe winter.

Cut the cabbage so as to leave about two inches or more of the stem attached to it; after which, scoop out the pith to about the depth of an inch, taking care not to wound or bruise the rind by the operation. Suspend the cabbages by means of a cord, tied round the stem, so that that portion of it from which the pith is taken remain uppermost, which regularly fill every morning with fresh water. By this simple method, cabbages, cauliflowers, brocoli, &c. may be preserved fresh during a long voyage, or, in a severe winter, for domestic use.

To manufacture salt by evaporation on faggots.

This method, according to Mr. Bakewell, is practised with great success at Montiers, in the Tarranties. There are four evaporating houses; the first and second receive the impregnated water from the reservoir, and evaporate one half of the water. They are 350 yards long, 25 feet high, and 7 feet wide, uncovered at the top. They consist merely of a frame of wood, composed of upright posts, 30 inches from each other, strengthened by cross bars, and supported by stone buttresses, under which are troughs to receive the water. These frames are filled with double rows of blackthorn faggots, placed loosely, so as to admit air, and supported by transverse pieces of wood. The water is raised above the faggots, and made to fall upon them, through holes in a gentle shower. It is then raised, and made to fall in like manner, till, by evaporation, it is reduced to half its original quantity. It is afterwards thrown in like manner over faggots in a third house, covered, to protect it from rain, till it is reduced to 1-7th of its original quantity. The fourth house requires to be only 70 yards long. It is afterwards carried into pans for boiling, and the salt is crystallized in the usual manner—8000 hogsheads at Montiers are, by the first two processes, reduced to 4,000; by the third to 1,100; and by the fourth to 550 hogsheads, which latter contain 22 per cent. of salt. The faggots are changed every four or five years.

To cool worts in brewing.

Let the worts pass through a pipe, turned like the worm of a still, and let the worm be immersed in any running water. Carry the pipe, at the lower end of the worm, into another vessel lower than the the first, and it will re-discharge itself at a temperature adapted to immediate fermentation.

To preserve eggs.

Hang them by hooks in strong cabbage-nets, and every day hook them on a fresh mesh, so as thereby to turn the eggs.

To boil potatoes mealy.

Select them of an uniform size, and pour over them cold water, in an uncovered pot just sufficient to cover them. When this first water nearly boils, pour it off, and replace it with a similar quantity of salted cold water They will thus be mealy, and not cracked. The prongs of a fork will prove when they are done.

To preserve potatoes.

Large quantities may be cured at once, by putting them into a basket as large as the vessel containing the boiling water will admit, and then just dipping them a minute or two at the utmost. The germ, which is so near to the skin, is thus killed without injuring the potatoe; and in this way several tons might be cured in a few hours. They should then be dried in a warm oven, and laid up in sacks or casks, secure from the frost, in a dry place.

Another method.

Another mode of preserving this valuable root, is first to peel them, then to grate them down into a pulp, which is put into coarse cloths, and the water squeezed out by putting them into a common press, by which means they are formed into flat cakes. These cakes are to be well dried and preserved for use as required. This is an excellent and ingenious mode of preserving potatoes, although attended with too much trouble on the large scale.

To choose the time for cutting wheat.

The cutting of grain should be commenced whenever the straw immediately below the ear is so dry that in twisting it no juice can be expressed, for then the grain cannot improve, as the circulation of juice to the ear is stopped. It matters not that the stalk below is green.

Every hour that the grain stands uncut, after passing this stage, is attended with loss.

To choose a carpet.

Always select one the figures of which are small; for in this case the two webs in which the carpeting consists, are always much closer interwoven than in carpets where large figures upon ample grounds are represented.

Renovation of manuscripts.

Take a hair pencil and wash the part which has been effaced with a solution of prussiate of potash in water, and the writing will again appear if the paper has not been destroyed.

Russian mode of making butter.

The process consists in boiling (or rather that species of boiling called simmering) the milk for the space of fifteen minutes, in its sweet state—observing, at the same time, not to use sufficient heat to burn the milk; it is then churned in the usual manner. This process produces butter immediately, and of a quantity far superior to that made from milk which has undergone vinous fermentation; and in addition to its superior flavour, it will preserve its qualities much longer than that made in the ordinary mode. Another advantage is, that the milk, being left sweet, is possessed of almost the same value for ordinary purposes, and more healthy, as the boiling or scalding destroys whatever animalculæ it may have contained.

In winter it would be advantageous to have the milk scalded in vessels calculated to stand in the kettle or boiler, by which mode the danger of burning the milk will be avoided; for milk only burns on the edges of its surface, or where it comes in contact with the sides of the vessel in which it is heated, which is obviated by placing kettles one within the other.

Great saving of hops, by substituting gentian root.

The proportion of gentian root to each bushel of malt varies from 1 ounce to an ounce and a half, to which it would be advantageous to add a quarter of a pound of hops. The gentian root is merely sliced and placed in the boiling wort precisely in the same manner which hops usually are—the flavour is fully equal; and the price considerably under the charge for the hop, the gentian not costing more than 1 1-2d. per oz.

Cure of rheumatism.

Take cucumbers, when full grown, and put them into a pot with a little salt; then put the pot over a slow fire, where it should remain for about an hour; then take the cucumbers and press them, the juice from which must be put into bottles, corked up tight, and placed in the cellar, where they should remain for about a week; then wet a flannel rag with the liquid, and apply it to the parts affected.

For the cure of violent itching of the feet from incipient chilblains.

One part of muriatic acid, mingled with seven parts of water, with which the feet must be well rubbed for a night or two before going to bed.—This application must be made before the skin breaks. It will prevent the further progress of the chilblains. The feet may be a little tender for a short time, but this slight inconvenience will soon disappear.

To preserve substances by heating in well closed vessels.

This mode of preserving vegetables as well as animal food, directs that the substances to be preserved are to be put into strong glass bottles, with necks of a proper size, corked with the greatest care, luted with a mixture of lime and soft cheese spread on rags, and the whole bound down with wires across it; the bottles are then inclosed separately in canvas bags, and put into a copper of water, which is gradually heated till it boils, and thus kept until it is presumed that the substances are as it were boiled in their own water. Meat or poultry ought to be three quarters boiled or roasted before it is put into the bottles; the whole is then left to cool, the bottles taken out, and carefully examined before they are laid by, lest they should have cracked or the lute given way. The patentees use stone jars, and tin boxes soldered up, instead of glass bottles.

To frame a polygraph, or instrument for writing two letters at once.

In this instrument, two pens, and even three if necessary, are joined to each other by slips of wood acting upon the pivot; one of these pens cannot move without drawing the other to follow all its movements; the rules are inflexible and they preserve in all their positions the parallelism which is given by uniting them. The movements of one of these pens are identically the same as those of the other; the characters traced by the first are the exact counterpart of those which the second has formed; if the one rise above the paper and cease to write, or rather if it make a scratch, or advance towards the ink bottle, the other, faithful to the movements which are transmitted to it by the species of light wood which directs it, either rises or scratches or draws ink, and that without having occasion to give any particular attention to it. The copy is made of itself, and without ever thinking of it.

The polygraph is not expensive; it is used without difficulty, and almost with the same facility as in ordinary writing. The construction is as simple as it is convenient; all the parts are collected so as to be taken to pieces and put up again very easily. Its size admits of its taking every desirable position, horizontal, perpendicular, or oblique, according to the application which is made of it, and the piece of furniture to which it is to be adapted; for it may be fixed to a drawer, a desk, an inkstand, an easel, or simply laid upon the table; it is generally accompanied by a drawer, and a case of the form and bulk of an ordinary desk.

To extinguish a recent fire.

A mop and a pail of water are generally the most efficacious remedies; but if it has gained head, then keep out the air, and remove all ascending or perpendicular combustibles, up which the fire creeps and increases in force as it rises.

To escape from or go into a house on fire.

Creep or crawl with your face near the

ground, and although the room be full of smoke to suffocation, yet near the floor the air is pure, and may be breathed with safety. The best escape from upper windows is a knotted rope, but if a leap is unavoidable, then the bed should be thrown out first, or beds prepared for the purpose.

Substitute for Stilton cheese.

Families may produce their own Stilton by the following simple process:—To the new milk of the cheese making morning, add the cream from that of the preceding evening, together with the rennet, watching the full separation of the curd, which must be removed from the whey without breaking, and placed in a sieve until of such a consistence as to bear being lifted up and placed in a hoop that will receive it without much pressure. The cheese as it dries will shrink up, and must therefore be placed from time to time in a tighter hoop, and turned daily until it acquires the proper degree of consistence for use or keeping.

To imitate Parmesan.

Let the day's milk be heated to the degree of 120 degrees of Fahrenheit, then removed from the fire until all motion ceases. Put in the rennet, allow an hour for the coagulation, after which set the curd on a slow fire until heated to 150 deg. during which the curd separates in small lumps. A few pinches of saffron are then thrown in together with cold water sufficient to reduce it instantly to a bearable heat, when the curd is collected by passing a cloth beneath it, and gathering it up at the corners. Place the curd in a circle of of wood without a bottom; lay it on a table covered by a round piece of wood, pressed down by a heavy stone. The cheese will acquire sufficient consistence in the course of a night to bear turning, when the upper side is to be rubbed with salt, and continued alternately for 40 days.

In Italy, the outer crust is next cut off, and the new surface varnished with linseed oil: but that may well be omitted, as well as colouring one side of it red.

To white wash.

Put some lumps of quick lime into a bucket of cold water, and stir it about till dissolved and mixed, after which a brush with a large head, and a long handle to reach the ceiling of the room, is used to spread it thinly on the walls, &c. When dry, it is beautifully white, but its known cheapness has induced the plaisterers to substitute a mixture of glue size and whiting for the houses of their opulent customers; and this, when once used, precludes the employment of lime-washing ever after; for the latter when laid on whiting, becomes yellow.

White washing is an admirable manner of rendering the dwellings of the poor clean and wholesome.

To prevent the smoking of a lamp.

Soak the wick in strong vingear, and dry it well before you use it; it will then burn both sweet and pleasant, and give much satisfaction for the trouble in preparing it.

Easy mode of taking impressions from coins, &c.

A very easy and elegant way of taking the impressions of medals and coins, not generally known, is thus described by Dr. Shaw:—Melt a little isinglass glue with brandy, and pour it thinly over the medal so as to cover its whole surface; let it remain on for a day or two, till it is thoroughly dried and hardened, and then taking it off it will be fine, clear, and as hard as a piece of Muscovy glass, and will have a very elegant impression of the coin. It will also resist the effects of damp air, which occasions all other kinds of glue to soften and bend if not prepared in this way.

Paste for sharpening razors.

Take oxide of tin levigated, vulgarly termed prepared putty, one ounce; saturated solution of oxalic acid, a sufficient quantity to form a paste. This composition is to be rubbed over the strop, and when dry a little water may be added. The oxalic acid having a great attachment for iron, a little friction with this powder gives a fine edge to the razor.

A natural dentifrice.

The common strawberry is a natural dentifrice, and its juice, without any preparation, dissolves the tartareous incrustations on the teeth, and makes the breath sweet and agreeable.

To make glass jars look like china.

After painting the figures, cut them out, so that none of the white of the paper remains, then take some thick gum arabic water, pass it over all the figures, and place them on the glass to taste: let them stand to dry for 24 hours, then clean them well with a wet cloth betwixt the prints, and let them stand a few hours longer lest the water should move any of the edges, then take white wax and flake white, ground very fine, and melt them together: with a japanning brush go all over the glass above the prints; done in this manner they will hold water; or, boil isinglass to a strong jelly, and mix it up with white lead ground fine, and lay it on in the same manner: or use nut oil and flake white. For a blue ground, do it with white wax and Prussian blue, ground fine; for red, wax and vermilion or carmine; for green, wax and verdigris; for a chocolate colour, wax and burnt umber.

To make artificial red coral branches, for the embellishment of grottoes.

Take clear rosin, dissolve it in a brass pan, to every ounce of which add 2 dr. of the finest vermilion; when stirred well together, choose the twigs and branches, peeled and dried, then take a pencil and paint the branches all over whilst the composition is warm: afterwards shape them in imitation of natural coral. This done, hold the branches over a gentle coal-fire, till all is smooth and even as if polished. In the same manner white coral may be prepared with white lead, and black coral, with lamp-black. A grotto may be built with little expense, of glass, cinders, pebbles, pieces of large flint, shells, moss, stones, counterfeit coral, pieces of chalk, &c. all bound or cemented together with the above described cement.

To prepare hair for wigs.

Hair which does not curl or buckle naturally, is brought to it by art, by first boiling and then baking it. After having picked and sorted the hair, and disposed it in parcels according to lengths, roll them up and tie them tight down upon little cylindrical instruments, either of wood or earthenware, a quarter of an inch thick, and hollowed a little in the middle, called pipes; in which state they are put in a pot over the fire, there to boil for about two hours. When taken out let them dry; and when dried, spread them on a sheet of brown paper, cover them with another, and thus send them to the baker, who making a crust around them of common paste sets them in an oven till the crust is about three-fourth baked.

To make wax candles.

Place a dozen of wicks on an iron circle, at equal distances, over a large copper vessel, tinned and full of melted wax; pour a ladleful of the wax on the tops of the wicks, one after another; what the wick does not take, will drop into the vessel, which must be kept warm by a pan of coals; continue this process till the candles are as large as required. If they are wanted of a pyramidical form, let the first three ladlesful be poured on at the top of the wick, the fourth at the height of three quarters, the fifth at half, and the sixth at a quarter; then take them down hot, and lay them beside each other in a feather bed folded in two to preserve their warmth and keep the wax soft; then take them down and roll them one by one on a smooth table, and cut off the thick end as required.

To make rush-lights, &c.

Take a quantity of rushes during the season, and strip off the skin from two sides thereof, leaving the pith bare. These, being quite dry, dip them in melted grease repeatedly, and a good light for all the purposes of a family, may thereby be obtained.

If cotton yarn, without knots, be procured, and passed round a small stick, the ends being slightly twisted together, good candles may be made by separating these, and dipping them in the same kind of grease repeatedly; but suffering each stick of candles to cool a little between dip and dip.

To make transparent dials for public clocks by night.

The figures, and all the other external parts, are filed to an angle, so that they shall not cast a shade in the oblique directions of the sight. Two circles, the one exterior, the other interior, have two grooves behind, for receiving two thicknesses of glass, formed of several pieces, the parts of which are joined together with cement behind the strips or little rods that form the figures; thus the joinings are not visible outside. Between the two glasses is a piece of white cloth which completely enclosed by the cement cannot be altered by time. To illuminate the transparent parts, first let the dial be fixed by its outer circle in a hole, made to fit in the wall; then, in the interval between the dial and the movement, make a moveable inclosure carrying one or more reflectors, according to the size of the dial, opposite to one another, in order that the rod may not cast a shadow; a pipe is placed above the lights, to convey away the smoke and vapour of the oil. The hands should be varnished black, that they may appear of the same colour by day and by night.

The form of the box enclosing the movement is a globe, proportioned to the size of the dial. The movement is carried by the dial, in order to have but one focus of the light; and then the centre of the dial remains opaque, and is varnished white for the day-light. The light is fixed to a door made in the globe, diametrically opposite to the centre of the dial, and a reflector is attached to the same door.

To make grindstones.

Take of river sand, three parts, of seedlac, washed, one part; mix them over a fire in a pot, and form the mass into the shape of a grindstone, having a square hole in the centre; fix it on an axis with liquified lac, heat the stone moderately, and by turning the axis it may easily be formed into an exact orbicular shape. Polishing grindstones are made only of such sand as will pass easily through fine muslin, in the proportion of two parts of sand to one of lac. This sand is found at Ragimaul. It is composed of small angular crystalline particles tinged red with iron, two parts to one of black magnetic sand. The stone-cutters, instead of sand, use the powder of a very hard granite called corune. These grindstones cut very fast. When they want to increase their power they throw sand upon them, or let them occasionally touch the edge of a vitrified brick. The same composition is formed upon sticks, for cutting stones, shells, &c. by the hand.

Improved coffee-pot.

Amongst the new Parisian inventions is a coffee pot constructed of three pieces: the first is a plain boiler, over that is a double filterer, and at the top is an inverted coffee-pot, which fits on exactly. Cold water is placed in the first vessel, and the coffee in the filtering-box. Under the whole is a spirit lamp, which in the course of five or six minutes causes the water to boil, the vapour arising from which completely saturates the coffee. When the water boils, which is ascertained by the discharge of the vapour from the spout of the inverted coffee-pot, the whole machine is lifted from the lamp, and completely inverted; so that the pot which was uppermost is at the bottom, and the boiling water, which had saturated the coffee, flows through the filterer, clear, into what was before the inverted coffee pot, where in the space of two minutes it is ready for use. This mode of preparing coffee is a saving of at least 25 per cent. and it secures the fine flavour of the berry.—In another part of the service is a coffee roaster, of glass, over another lamp of a long wide flame. The roasting requires about three minutes, and even so small a quantity as an ounce may be thus prepared.

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