*vation and Manufacture of Tea* illustrates the method in which a flush or shoot is picked, aud the portions which go to make special classes of tea. The lines in the diagram show the points at which the shoot may be picked, and it is important that the lowest leaf taken should be so nipped off as to leave the bud in its axil uninjured on the branch, as from it the next flush will then develop. The three leaves at the growing point (*a*, *b, c)* yield pekoe, and the whole shoot down to and including *f* gives pekoe souchong. In the order of their age, the individual leaves manufacture into *a* flowery pekoe, *b* orange pekoe, *c* pekoe, *d* pekoe souchong, *e* souchong, and *f* congou. Were the flush further developed another leaf might be taken, which would be classed as bohea, but that is not a quality recognized by Indian growers. It is not, however, the practice to pick or treat leaves separately, the whole flush being manipulated together, and the tea is only separated into qualities by sifting after the manufacturing processes have been completed.

The manufacture of black tea is found to be an essentially simple matter. Many of the processes employed by the Chinese are quite superfluous, and several of the manual operations which bulk largely in the Chinese manufacture, it is found, can with advantage be supplanted by mechanical agency. The whole object of the black-tea manufacturer is to ferment, roll, and dry the leaf, and for that purpose the leaves undergo—(1) withering, (2) rolling, (3) fermenting, and (4) firing or dholing. Between the fermenting and the firing operations it is desirable to expose the leaves to the direct sunlight for an hour or thereby. This cannot always be done, as it is impossible to keep the fermented leaves after they have attained their proper state ; nevertheless the best result is always attained in bright weather, when it is possible to expose the fermented leaves to the sun.

The fresh leaves from the garden, as they are brought in to the factory, are withered by being spread evenly over square wicker­work trays—leaf challanies—thickly or thinly as the weather is hot or cool. Thus they are left exposed to the air till they become quite soft and flaccid, folding together when pressed in the hand into a clammy mass without crackling or rebound. In cloudy or rainy weather it becomes necessary to wither by machine, acting on the leaves with artificially dried and heated air. Withering is a preliminary to rolling, in which the flaccid and velvety leaves are kneaded, twisted, and rolled back and forward over a table till the whole comes into a mashy condition by the exudation of juice. While in Chinese tea-making that juice is squeezed out of the leaves, in India it is most carefully lapped up and absorbed in the spongy mass. In hand-rolling as much as can be worked between two hands is operated on, and passed from man to man along the table till fully worked, when it is made up into a compressed ball and so put aside for fermenting. This process is the distinguishing feature of black-tea making, and on its sufficient accomplishment depends much of the character and quality of the tea made. The progress of the fermentation must be carefully watched, and at the point when by the colour it is known to be sufficiently advanced the tea is in favourable weather sunned by exposure, thinly spread out to the sunlight for about an hour. It is immediately there­after fired, either by the fumes of burning charcoal or by a current of dried and heated air from one of the numerous machines now in use. With this single firing the process is completed, and the tea so finished is sifted by machinery into commercial qualities according to the size of the leaf.

For the entire range of manufacturing operations numerous forms of machinery and mechanical devices have been adapted and intro­duced in Indian gardens, so that, apart from picking the leaves, tea-making has become practically a factory industry.

The manufacture of green tea is comparatively little prosecuted in India. In Europe the demand has greatly fallen away, and, though the consumption is considerable in the United States, the supply is principally drawn from Japan, where its preparation is

2120 F. In a range of thirty-five samples the average moisture was equal to 7∙67 per cent., the lowest—in a Chinese young hyson— being 4∙84, while in several congous it exceeded 10 per cent. The ash in sixty-seven specimens of ordinary and special (undried) teas he found to average 5∙78 per cent., the maximum being 7∙02 and the minimum 5∙17 ; and of that ash 54∙50 per cent. was soluble in water. The proportion of extractive substances in twenty-four teas varied from 26∙15 in a congou to 44∙85 in Moyune young hyson. The total average nitrogen from sixty green teas, slightly faced, was 3∙76, from sixty black teas 3∙26, from six Assam teas 3∙64, and from exhausted leaves 3∙80 per cent.

So long as the Western world remained almost exclusively

extensively practised. The manufacture as carried on in the North- Western Provinces resolves itself into a rapid rolling and drying of the leaf. Without permitting the leaves to wither after gathering, they are, if free from moisture, at once by exposure to a brisk heat sweated and softened for rolling. They are then without delay rolled as in black-tea manufacture, next spread out in the sun till they take a blackish tinge, then again rolled, and this rolling and exposure may be repeated yet a third time. When the rolling is completed the tea is placed in a highly heated pan, in which it is stirred about briskly till the whole mass becomes too hot to be worked by hand. Then it is tightly packed in a strong canvas bag, in which it is beaten by a heavy flat stick to consolidate it, and in this condition left for a night. Next day it is fired off in a pan, beginning with a high heat, which is gradually reduced during the nine hours or thereby of the operation, an incessant stirring and tossing being kept up the whole time. During this firing off the green colour of the tea is developed; and Indian green tea never owes any of its colour to “facing” with foreign substances.

The qualities of a sample of tea and its commercial value can only with accuracy be determined by actual infusion and trial by a skilled tea-taster. Certain general and external appearances which indicate the class of a tea are obvious enough ; but, although a pekoe may be readily distinguished from a souchong, the souchong of certain planters or districts may be more valuable than other pekoes. While it is impossible to define the conditions which determine the commercial value of an ordinary black tea, Col. Money lays down the following rules : the darker the liquor the stronger the tea, and the nearer the approach of the infused leaf to a uniform salmony brown the purer the flavour. Black tea of good quality should in infusion yield a clear bright brown liquor emitting a subdued fragrance, and in taste it should be mild, bland, and sweetish, with an agreeable astringency. Green tea yields a light-coloured liquor of high fragrance, but thin, sharp, aud somewhat rasping in taste as compared with black tea.

The chemical components of tea leaves are essential oil, theine, tannin, boheic acid, quercetin, quercitannic acid, gallic acid, oxalic acid, gum, chlorophyll, resin, wax, albuminoids, colouring matters, cellulose, and mineral ash. Of these the first three—essential oil, theine, and tannin—are of importance in the infused beverage. The essential oil, on which the flavour of tea depends, is present to the extent of from 0∙6 to 1 per cent. Theine (C8H10N4O2) is an alkaloid identical with the caffeine obtained from coffee, and it is remarkable that the same substance is yielded by the maté or Paraguayan tea and the guarana of South America, and by the kola nut of Central Africa. The theobromine of cocoa is also closely allied to theine, and the characteristic components of the extract of meat similarly show certain points of contact with these stimulant bodies. To the tannin of tea infusions is due what is known as the strength of the tea. Prof. Dittmar has recently examined a number of China and Indian teas in regard to the pro­portions of theine and tannin in their infusions and to the depend­ence of these proportions on the time of infusion. The general result was that Chinese tea yields more theine and less tannin than Indian tea, and that in both cases 10 minutes’ infusion extracts practically all the theine. Longer infusion adds only to the tannin that passes into the solution, and, as excess of tannin impedes diges­tion, prolonged infusion is hurtful and ought to be avoided.

The quantitative composition of tea is of course subject to great variation. The analyses by Mul­der given in the accompanying table furnish a general idea of the proportion of constituents.

A series of investigations into a large number of teas has been carried out by Mr G. W. Wigner (*Pharm. Jour.,* 3d series, vi. 261, 281, 402). In tea as imported he found large proportions of moisture which could be expelled on exposure to a temperature of

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|  | Hyson. Green. | Congou Black. |
| Volatile oil | 0∙79 | 0∙60 |
| Chlorophyll | 2∙22 | 1∙84 |
| W ax | 0∙28 | 0Ό0 |
| Resin | 2∙22 | 3∙64 |
| Gum | 8∙56 | 7∙28 |
| Tannin | 17∙80 | 12∙88 |
| Theine@@1 | 0∙43 | 0∙46 |
| Extractive matter. | 22∙80 | 21∙36 |
| Colouring matter.. | 23∙60 | 19∙12 |
| Albumen | 3∙00 | 2∙80 |
| Woody fibre | 17∙08 | 28∙32 |
|  | 98∙78@@2 | 98∙30@@2 |

@@@1 The theine is certainly understated ; more recent observers obtain from 1∙8 to 3 per cent., and occasionally more.

@@@2 The mineral salts (ash) partly included in these totals amounted to 5∙56 and 5∙24 respectively.