

wasting disease follows. The children suffer from dropsy of the testicles while they are young, but this disappears as they grow up. Puberty is attained late in such a district.

5. So much for the influence of the warm and cold winds. Let us now consider districts which are exposed to winds from the quarter between north-east and south-east, and then those from the west. Those that face east are likely to be healthier than those facing north or south even if such places are only a furlong apart. These districts do not experience such extremes of heat and cold. The water, to the easterly side, must necessarily be clean, sweet-smelling, soft and pleasant. This is because the early morning sunshine distils dew from the morning mist. The inhabitants are generally of good and healthy complexion unless they are subject to disease. They have loud and clear voices and if, as is probable, local conditions generally are better, they are of better temperament and intelligence than those exposed to the north. The climate in such a district may be compared with the spring in that there are no extremes of heat and cold. As a consequence, diseases in such a district are few and not severe. In general, it may be said that they resemble districts of southern aspect except that the women are prolific and give birth easily.

6. Towns that face west and are thus sheltered from easterly winds while the warm winds and those from the south pass them by, must necessarily have a most unhealthy situation. First, the water is not clear. This is because the air holds the early morning mist and such air, mixing with water, takes away its sparkle, for it does not get the sun on it until late in the day. In summer damp breezes blow and cause dew to fall in the early morning, but for the rest of the day the sun, as it declines, burns up the inhabitants. This tends to make them of poor complexion and sickly and they suffer from all the diseases previously mentioned without exception. Their voices are thick and somewhat hoarse on account of the air which tends to be impure and unhealthy. Not even the northerly gales reach such districts to dispel these characteristics. All the winds that blow are from the west and therefore very wet.

MEDICINE

The weather of such a district can be compared with the autumn when there is so great a difference between morning and evening.

7. So much then for the effects, both good and ill, of the various winds. Now I should like to explain what is the effect of different kinds of water, to indicate which are healthy and which unhealthy, and what effects, both good and bad, they may be expected to produce. Water plays a most important part in health. Stagnant water from marshes and lakes will necessarily be warm, thick and of an unpleasant smell in summer. Because such water is still and fed by rains, it is evaporated by the hot sun. Thus it is coloured, harmful and productive of biliousness. In winter it will be cold, icy and muddied by melting snow and ice. This makes it productive of phlegm and hoarseness. Those who drink it also have large and firm spleens while their bellies are hard, warm and thin. Their shoulders, the parts about the clavicles and their faces are thin too because their spleens dissolve their flesh. Such men have a great appetite for food and drink. Their viscera will be very dry and warm and thus require the stronger drugs. Their spleens remain enlarged summer and winter and, in addition, cases of dropsy are frequent and fatal to a high degree. The reason for this is the occurrence, during the summer, of much dysentery and diarrhoea together with prolonged quartan fevers. Such diseases, when they are of long standing, cause dropsy in people of this type and this proves fatal. These, then, are the summer ailments. In winter, the younger men are liable to pneumonia and to madness. The older men suffer from a fever called *causus* on account of the hardness of their bellies, the women from tumours and leucorrhoea. The latter are weak in the belly and give birth with difficulty. The foetus is large and swollen. During lactation, wasting and pains occur and menstruation does not become properly re-established. The children are specially liable to rupture and the men to varicose veins and ulcers of the legs. People of such nature cannot be long-lived and they become prematurely aged. Moreover, sometimes the women appear to have conceived but, when the time of birth approaches, the contents of

the belly disappear. This happens when the womb suffers from dropsy. Water which produces these things, I consider harmful in every respect.

We now come to the consideration of water from rock springs. It is hard; either from the soil containing hot waters, or from iron, copper, silver, gold, sulphur, alum, bitumen or nitre. All these substances are formed by the influence of heat. The water from such ground is bad since it is hard, heating in its effect, difficult to pass and causes constipation.

The best water comes from high ground and hills covered with earth. This is sweet and clean and, when taken with wine, but little wine is needed to make a palatable drink. Moreover, it is cool in summer and warm in winter because it comes from very deep springs. I particularly recommend water which flows towards the east, and even more that which flows towards the north-east, since it is very sparkling, sweet-smelling and light. Water that is salty, hard and cannot be softened, is not always good to drink. But there are some constitutions and some diseases which benefit by drinking such water and these I shall proceed to detail. The best type of this water is that which comes from springs facing the east. The second best from springs facing the quarter between north-east and north-west, especially the more easterly, and the third from springs between north-west and south-west. The worst is the southern variety, the springs facing between south-west and south-east. These water supplies are worse when the winds are southerly than when they are northerly.

Waters should be used in the following way. A man who is in good and robust health need not distinguish between them, but he may drink whatever is to hand at the moment. But if a sick man wishes to drink what is best for him, he would best regain his health by observing the following rule. If his stomach is hard and liable to become inflamed, the sweetest, lightest and most sparkling water is best for him; but if his stomach is soft, moist and full of phlegm, the hardest and saltiest are best since these will best dry it up. The water that is best for cooking and softest is likely to relax and soften the stomach. Hard water that is not softened by boiling tends

to make the stomach contract and dries it up. Owing to ignorance, there is a general fallacy about brackish water. Salty water is thought to be a laxative; actually the opposite is the case and permanently hard water tends to make the bowels costive.

8. We now pass from spring water to a consideration of rain water and water from snow. Rain water is very sweet, very light and also very fine and sparkling, since the sun, drawing it up, naturally seizes upon the finest and lightest water, as is proved by the salt which is left behind. The brine is left on account of its thickness and heaviness and becomes salt, but the sun draws up the finest elements because of their lightness. It draws it up not only from ponds, but also from the sea and in fact from any source which contains moisture; and there is nothing that does not contain some. Even from human beings, it draws off the finest and lightest part of the body's humours. A very good proof of this is seen when a man goes and sits in the sun wearing a cloak. Where sunlight falls on the body, no sweat will be seen, but the part which is shaded or protected by something becomes damp with sweat. This is because the sun draws up the sweat and makes away with it; but where the body is shaded, the sweat remains because the sunlight cannot get at it. If the man goes in the shade, the whole body sweats alike because the sun is no longer on him. Rain water, being composed of a mixture of so many elements, quickly becomes rotten on standing and exhales a foul smell. But when it has been drawn up into the air, it travels round and mixes with the air; the dark and cloudy part is separated and becomes cloud and mist, while the clearest and lightest part is left, sweetened by the sun heating and boiling it. Everything is sweetened by boiling. So long as it is scattered and does not mass together, it remains floating in the air. But when it is gathered and collected suddenly by the assault of contrary winds, then it falls wherever there happens to be the densest cloud. This is most likely to happen when a wind has gathered some clouds together and is driving them along and then another wind suddenly confronts it with another mass of clouds. Then the first cloud is stopped and the

following ones pile up on it till it becomes thick and black and dense, and its weight causes it to turn to rain and fall. Rain water, therefore, is likely to be the best of all water, but it needs to be boiled and purified. If not, it has a foul smell and causes hoarseness and deepness of the voice in those that drink it.

Water from snow and ice is always harmful because, once it has been frozen, it never regains its previous quality. The light, sweet and sparkling part of it is separated and vanishes leaving only the muddiest and heaviest part. You may prove this, if you wish, by measuring some water into a jar and then leaving it out in the open air on a winter's night in the coldest spot you can find. Next morning bring it back into the warmth again and, when it has thawed, measure it a second time. You will find the quantity considerably less. This shows that in the process of freezing, the lightest and finest part has been dried up and lost, for the heaviest and densest part could not disappear thus. For this reason I consider such water to be the most harmful for all purposes.

9. The effect of drinking water collected from many different sources, that is, from large rivers fed by smaller streams and from lakes into which many streams flow from different directions, is to cause a propensity to stone, gravel in the kidneys, strangury, pain in the loins and rupture. The same is true of water brought long distances from its source. The reason for this is that no two sorts of water can be alike but some will be sweet, some salt and astringent and some from warm springs. When they are all mixed they quarrel with one another and the strongest is always the dominant. But each one has not always the same strength and sometimes one is dominant, sometimes another according to which wind is blowing. One will be made strong by the north wind, another by the south and so on. Such water will leave a sediment of sand and slime at the bottom of the jar and it is by drinking this that the diseases mentioned above are caused. There are, however, certain exceptions and these I shall detail.

Those whose stomachs are healthy and regular, and whose bladders are not subject to inflammation, nor in whom the

neck of the bladder is overmuch obstructed, pass water easily and nothing collects in the bladder. But if the belly is liable to fever the same must be true of the bladder, and when this organ is heated with fever, the neck of the bladder becomes inflamed and does not allow the urine to pass which instead becomes heated and condensed. The finest and clearest part is separated, passes through and is voided. The densest and cloudiest part is gathered together and precipitates in small pieces at first and then in larger ones. The gravel formed is rolled round by the urine and coalesces to form a stone. When water is passed this falls over the neck of the bladder, and being pressed down by the pressure of the urine, prevents the urine from being passed. Great pain is thus caused. As a result, children suffering from stone rub or pull at their private parts because they think that in them lies the cause why they cannot make water. The fact that people who suffer from stone have very clear urine is proof that the densest and muddiest part remains in the bladder and collects there. This is the explanation of most cases of this disease but, in children, stones may also be caused by milk. If milk is not healthy but too warm and bilious-looking, it heats the stomach and the bladder and the urine is heated and a similar result is produced to that already described. Indeed, I assert that it is better to give children wine watered down as much as possible for this neither burns the veins nor dries them up too much. Female children are less liable to stone because the urethra is short and wide and the urine is passed easily. Neither do they masturbate as the males do, nor touch the urethra. In the female the urethra is short; in males it is not straight and it is narrow as well. Moreover, girls drink more than boys.

10. Now let us consider the seasons and the way we can predict whether it is going to be a healthy or an unhealthy year. It is most likely to be healthy if the signs observed at the rising and the setting of the stars occur normally, when there is rain in the autumn, when the winter is moderate being neither too mild nor excessively cold, and when rain falls seasonably in spring and in summer. But if the winter be dry with northerly winds prevailing and the spring wet with southerly

winds, the summer will of necessity be feverish and productive of ophthalmia and dysentery. For when stifling heat succeeds while the ground is still wet from the spring rains and southerly winds, the heat will be twice as great. Firstly because of the soaked warm earth and secondly because of the blazing sun; and, moreover, men's stomachs will not be toughened nor the brain firm. In such a spring the flesh cannot but become flabby and this predisposes to acute fevers, especially in those of phlegmatic constitution. Dysentery is likely to attack women and those of watery constitution. Should the etesian winds blow and there is bad weather and rain at the rising of the Dog Star, then it may be hoped that these bad conditions will come to an end and that the autumn will be a healthy one. But if there is no amelioration in the conditions there is a danger of fatalities among women and children; the elderly are in the least danger. Those who recover are liable to quartan fevers in which dropsy may supervene.

If the winter is wet and mild with southerly winds and this is followed by a wintry dry spring with the wind in the north, the effect will be as follows. First, women who happen to be pregnant and approaching term in the spring are likely to have miscarriages. Or, if they do give birth, the babies are so weak and sickly that either they die at once or, if they survive, they are frail and weak and very liable to disease. The men are liable to dysentery and dry ophthalmia, while some will suffer from catarrh of the head which may spread to the lungs. It is those who are full of phlegm, as well as the women, who are likely to suffer from dysentery since the phlegm flows down from the brain on account of their moist constitutions. On the other hand, those who are full of bile suffer from dry ophthalmia on account of the warmth and dryness of the flesh, while the old, owing to the permeability and exhaustion of the blood-vessels, suffer from catarrh. This last illness may prove suddenly fatal to some, while others are afflicted with a right- or left-sided hemiplegia. The explanation of these diseases is this. When the winter is warm with wet south winds neither the brain nor the blood-vessels become consolidated. Thus, when spring comes with dry cold northerly winds, the brain

becomes stiff and cold just when it ought to thaw and become purified by running of the nose and hoarseness. It is the sudden change when the heat of summer comes that is responsible for these diseases.

Districts which are well situated with regard to the sun and the winds and which have a good water supply are the least affected by such changes in the weather; those badly situated with regard to the sun and the winds and which draw their water from marsh or lake, the most. If the summer be dry, diseases are short lived, but if it is wet they last long and there is the danger of a sore appearing on the slightest pretext if the skin is broken. Diarrhoea and dropsy occur towards the termination of illnesses under such conditions because the bowels do not dry.

If the summer is rainy with southerly winds and the autumn similar, the winter will necessarily be unhealthy. Those of phlegmatic constitution and those over forty years old may suffer from *causus*, while those who are full of bile suffer from pleurisy and pneumonia. If the summer is dry with northerly winds and the autumn wet with the wind in the south, the winter brings a danger of headache and gangrene of the brain. Further, there is likely to be hoarseness, running at the nose and cough and, in some cases, consumption. If the autumn is rainless with northerly winds and there is rain neither under the Dog Star nor at Arcturus, this weather suits best those who are naturally phlegmatic and of a watery constitution and also women. But it is most inimical to those of a bilious disposition because they become dried up too much. This produces dry ophthalmia and sharp fevers which last a long time and also, in some cases, 'black bile' or melancholy. The reason for this is found in the drying up of the more fluid part of the bile while the denser and more bitter part is left behind. The same is true of the blood. But these changes are beneficial to those of phlegmatic habit so that they become dried up and start the winter braced up instead of relaxed.

11. Anyone making observations and drawing deductions on these lines can foretell most of the effects which follow changes in the weather. It is particularly necessary to take

precautions against great changes and it is inadvisable to give a purge, to cauterize or to cut any part of the belly until at least ten days have passed after such a change. The most dangerous times are the two solstices, especially mid-summer, and the equinoxes. Both of these latter times are considered dangerous but more especially the autumnal one. Care must also be taken at the rising of certain stars, particularly the Dog Star and Arcturus. Similarly, discretion must be exercised at the setting of the Pleiads. It is at such times that the crisis is reached in the course of diseases; some prove fatal and some are cured, but all show some kind of change and enter a new phase.

12. I now want to show how different in all respects are Asia and Europe, and why races are dissimilar, showing individual physical characteristics. It would take too long to discuss this subject in its entirety but I will take what seem to me to be the most important points of difference.

Asia differs very much from Europe in the nature of everything that grows there, vegetable or human. Everything grows much bigger and finer in Asia, and the nature of the land is tamer, while the character of the inhabitants is milder and less passionate. The reason for this is the equable blending of the climate, for it lies in the midst of the sunrise facing the dawn. It is thus removed from extremes of heat and cold. Luxuriance and ease of cultivation are to be found most often when there are no violent extremes, but when a temperate climate prevails. All parts of Asia are not alike, but that which is centrally placed between the hot and the cold parts is the most fertile and well wooded; it has the best weather and the best water, both rain water and water from springs. It is not too much burnt up by the heat nor desiccated by parching drought; it is neither racked by cold nor drenched by frequent rains from the south or by snow. Crops are likely to be large, both those which are from seed and those which the earth produces of her own accord. But as the fruits of the latter are eaten by man, they have cultivated them by transplanting. The cattle raised there are most likely to do well, being most prolific and best at rearing their young. Likewise, the men are well

made, large and with good physique. They differ little among themselves in size and physical development. Such a land resembles the spring time in its character and the mildness of the climate.

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16.* So much for the differences of constitution between the inhabitants of Asia and of Europe. The small variations of climate to which the Asiatics are subject, extremes both of heat and cold being avoided, account for their mental flabbiness and cowardice as well. They are less warlike than Europeans and tamer of spirit, for they are not subject to those physical changes and the mental stimulation which sharpen tempers and induce recklessness and hot-headedness. Instead they live under unvarying conditions. Where there are always changes, men's minds are roused so that they cannot stagnate. Such things appear to me to be the cause of the feebleness of the Asiatic race, but a contributory cause lies in their customs; for the greater part is under monarchical rule. When men do not govern themselves and are not their own masters they do not worry so much about warlike exercises as about not appearing warlike, for they do not run the same risks. The subjects of a monarchy are compelled to fight and to suffer and die for their masters, far from their wives, their children and friends. Deeds of prowess and valour redound to the advantage and advancement of their masters, while their own reward is danger and death. Moreover, such men lose their high-spiritedness through unfamiliarity with war and through sloth, so that even if a man be born brave and of stout heart, his character is ruined by this form of government. A good proof of this is that the most warlike men in Asia, whether Greeks or barbarians, are those who are not subject races but rule themselves and labour on their own behalf. Running risks only for themselves, they reap for themselves the rewards of bravery or the penalties of cowardice. You will also find that the Asiatics differ greatly among themselves, some being better

* At this point some paragraphs have been lost, and the order of what remains is uncertain.

and some worse. This follows from the variations of climate to which they are subject, as I explained before.

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13. Such then is my opinion of Egypt and Libya. I will now discuss the area to the east-north-east as far as Lake Maeotis,* for this is the boundary between Europe and Asia. The people inhabiting these regions differ more among themselves than those discussed previously on account of the changeability of the weather and the nature of the terrain. And what is true of the soil is true of the men. Where the weather shows the greatest and the most frequent variations, there the land is wildest and most uneven. You will find mountains, forests, plains and meadows. But where there is not much difference in the weather throughout the year, the ground will be all very level. Reflection will show that this is true of the inhabitants too. Some men's characters resemble well-wooded and watered mountains, others a thin and waterless soil, others plains or dry bare earth. Climates differ and cause differences in character; the greater the variations in climate, so much the greater will be differences in character.

14. I will leave out the minor distinctions of the various races and confine myself to the major differences in character and custom which obtain among them. First the Macrocephali; no other race has heads like theirs. The chief cause of the length of their heads was at first found to be in their customs, but nowadays nature collaborates with tradition and they consider those with the longest heads the most nobly born. The custom was to mould the head of the newly-born children with their hands and to force it to increase in length by the application of bandages and other devices which destroy the spherical shape of the head and produce elongation instead. The characteristic was thus acquired at first by artificial means, but, as time passed, it became an inherited characteristic and the practice was no longer necessary. The seed comes from all parts of the body, healthy from the healthy parts and sickly from the sickly. If therefore bald parents usually have bald

*The Sea of Azov.

children, grey-eyed parents grey-eyed children, if squinting parents have squinting children, why should not long-headed parents have long-headed children? But in fact this does not happen as often as before, because the custom of binding the head has also become obsolete through intercourse with other peoples.

15. I pass now to consider the people who live near the river Phasis.* Their land is marshy, warm, wet and thickly covered with vegetation. Violent rainstorms occur there frequently at all seasons of the year and the inhabitants live in the marshes. Their houses are built on the water of wood and reeds and they do very little walking to go to town or to market, but sail up and down along the many canals in dug-out canoes. They drink warm stagnant water which has been rotted by the sun and swollen by the rains, and the Phasis itself is the most sluggish and stagnant of all rivers. The crops that grow there are all poor, feeble and do not ripen well owing to the superabundance of water which interferes with the ripening process. The ground is often covered with mist. As a result of this the Phasians have peculiar constitutions. They are big and stout and their joints and veins are obscured by flesh. Their skin is yellowish as if they had jaundice and their voices, because they breathe the air which is moist and damp and not clean, are the deepest known. They have little stamina but become quickly tired. The climate varies very little and the prevailing winds are southerly, except for one local breeze which sometimes blows a stiff warm gale. They call this wind the Kenkhron. The north wind never blows hard even when it does blow.

17.† In Europe, on the other hand, and living round Lake Maeotis, there is a special race of Scythians which differs from all other peoples. They go by the name of Sauromatae. Their women ride horses and shoot arrows and hurl javelins from horseback and they fight in campaigns as long as they remain virgins. Nor do they lose their virginity until they have killed three of their enemies and have offered such sacrifices as are prescribed by ritual law. But once a woman has taken to herself a husband she does not ride again unless military necessity

*Rion.

†See note on p. 160.

should require their total forces to take to the field. The women have no right breast since their mothers heat a specially made iron and apply it to the breast while they are still children. This prevents the breast from growing and all the strength and size of it go into the right arm and shoulder instead.

18. As regards the appearances of other tribes of Scythians, the same is true of them as is true of the Egyptians, namely, that they have certain racial characteristics, but differ little among themselves. They differ, however, from the Egyptians in that their peculiarities are due to cold instead of to heat. The so-called Scythian desert is a grassy plain devoid of trees and moderately watered, for there are large rivers there which drain the water from the plains. Here live the Scythians who are called nomads because they do not live in houses but in wagons. The lighter wagons have four wheels but some have six, and they are fenced about with felt. They are built like houses, some with two divisions and some with three, and they are proof against rain, snow and wind. The wagons are drawn by two or three yokes of hornless oxen; hornless because of the cold. The women live in these wagons while the men ride on horseback, and they are followed by what herds they have, oxen and horses. They stay in the same place as long as there is enough grass for the animals but as soon as it fails they move to fresh ground. They eat boiled meat and drink the milk of mares, from which they also make a cheese.

19. So much then for their mode of life and customs. As regards their physical peculiarities and the climate of their lands, the Scythian race is as far removed from the rest of mankind as can be imagined and, like the Egyptians, they are all similar to one another. They are the least prolific of all peoples and the country contains very few wild animals and what there are are very small. The reason for this is their situation in the far north under the Rhipaeon mountains from which the north wind blows. The sun shines most brightly towards its setting in the summer and then it warms them only for a very short time and not very much. In addition, the winds from warm lands do not reach as far, as a rule, or, if they do,

they are weak. Instead, northerly winds, chilled with snow and ice and charged with great rains, blow continuously and never leave the mountains which makes them most inhospitable. During the daytime mist often covers the plains where the people live and, in fact, winter is nearly continuous all the year round. The summer lasts only a few days and these are not very summery for the plains are highly situated, bare of trees and are not engirdled by mountains, but slope from the north. The only wild animals found there are those small enough to shelter underground. The cold weather together with the barrenness of the ground, which affords neither warmth nor shelter, prevents their growth. There are no great nor violent changes with the seasons, the climate remaining very much the same all the year round. The people differ little in physique as they always eat similar food, wear the same clothes winter and summer, breathe moist thick air, drink water from snow and ice and do no hard work. The body cannot become hardened where there are such small variations in climate; the mind, too, becomes sluggish. For these reasons their bodies are heavy and fleshy, their joints are covered, they are watery and relaxed. The cavities of their bodies are extremely moist, especially the belly, since, in a country of such a nature and under such climatic conditions, the bowels cannot be dry. All the men are fat and hairless and likewise all the women, and the two sexes resemble one another. Owing to the lack of variation in the weather, the coagulation of the seed is not prevented or impeded unless there is some violent injury or inter-current disease.

20. As a proof of this moistness of the constitution, I may instance the following. You will find that the majority of the Scythians, especially those who are nomads, are cauterized on the shoulders, arms, wrists, chests, hips and loins. This is done simply for the softness and moistness of their constitutions because otherwise they could neither bend their bows nor put any weight into throwing the javelin. But when they have been cauterized the moisture is dried out of their joints and their bodies become more sinewy and stronger and their joints may then be seen. They grow up flabby and stout for two

reasons. First because they are not wrapped in swaddling clothes, as in Egypt, nor are they accustomed to horse-riding as children which makes for a good figure. Secondly, they sit about too much. The male children, until they are old enough to ride, spend most of their time sitting in the wagons and they walk very little since they are so often changing their place of residence. The girls get amazingly flabby and podgy. The Scythians have ruddy complexions on account of the cold, for the sun does not burn fiercely there. But the cold causes their fair skins to be burnt and reddened.

21. People of such constitution cannot be prolific. The men lack sexual desire because of the moistness of their constitution and the softness and coldness of their bellies, a condition which least inclines men to intercourse. Moreover, being perpetually worn out with riding they are weak in the sexual act when they do have intercourse. These reasons suffice as far as the men are concerned. In the case of the women, fatness and flabbiness are also to blame. The womb is unable to receive the semen and they menstruate infrequently and little. The opening of the womb is sealed by fat and does not permit insemination. The women, being fat, are easily tired and their bellies are cold and soft. Under such conditions it is impossible for the Scythians to be a prolific race. As a good proof of the sort of physical characteristics which are favourable to conception, consider the case of serving wenches. No sooner do they have intercourse with a man than they become pregnant, on account of their sturdy physique and their leanness of flesh.

22. Further, the rich Scythians become impotent and perform women's tasks on an equal footing with them and talk in the same way. Such men they call Anarieis. The Scythians themselves attribute this to a divine visitation and hold such men in awe and reverence, because they fear for themselves. Indeed, I myself hold that this and all other diseases are equally of divine origin and none more divine nor more earthly than another. Each disease has a natural cause and nothing happens without a natural cause. My own explanation of this disability of the Scythians is this. As a result of horse-riding they are afflicted with varicosity of the veins because

their feet are always hanging down from their mounts. This is followed by lameness and, in severe cases, those affected drag their hips. They treat themselves by their own remedy which is to cut the vein which runs behind each ear. The haemorrhage which follows causes weakness and sleep and after this some, but not all, awake cured. My own opinion is that such treatment is destructive of the semen owing to the existence of vessels behind the ears which, if cut, cause impotence and it seems to me that these are the vessels they divide. Consequently when they come into the presence of their wives and find themselves impotent, they do not perhaps worry about it at first, but when after the second and third and more attempts the same thing happens, they conclude that they have sinned against the divinity whom they hold responsible for these things. They then accept their unmanliness and dress as women, act as women and join with women in their toil.

That it is the rich Scythians, those of the noblest blood and the greatest wealth, and not their inferiors, who suffer from this disease is due to horse-riding. The poor suffer less because they do not ride. Yet, surely, if this disease is more to be considered a divine visitation than any other, it ought to affect not only the rich but everyone equally. Rather, the poor should be specially liable to it if the gods really do delight in honours and the admiration of men and bestow favours in return. It is the rich who make frequent sacrifice and dedication to the gods because they have the means. The poor, being less well provided with goods, sacrifice less and accompany their prayers with complaint. Surely it is the poor and not the rich who should be punished for such sins. Really, of course, this disease is no more of 'divine' origin than any other. All diseases have a natural origin and this peculiar malady of the Scythians is no exception. The same thing happens in other races. Those who ride the most suffer most from varicose veins, pain in the hips and gout and they are the less able to perform their sexual functions. This is the fate of the Scythians. They are the most effeminate race of all mankind for the reasons I have given, and because they always wear trousers and spend so much of their time on horseback so that they do not

handle their private parts, and, through cold and exhaustion, never have even the desire for sexual intercourse. Thus they have no sexual impulses in the period before they lose their virility.

23. The remaining peoples of Europe differ widely among themselves both in size and appearance owing to the great and frequent climatic changes to which they are subject. Hot summers and hard winters, heavy rains followed by long periods of drought, all these occasion variations of every kind. It is reasonable that these changes should affect reproduction by variations in the coagulability of the semen so that its nature is different in summer and winter, in rainy weather and times of drought. I believe this to be the reason for the greater variation among individuals of the European races, even among the inhabitants of a single city, than is seen among Asiatics and also why they vary so much in size. When the weather changes often, abnormalities in the coagulation of the semen are more frequent than when the weather is constant. A variable climate produces a nature which is coupled with a fierce, hot-headed and discordant temperament, for frequent fears cause a fierce attitude of mind whereas quietness and calm dull the wits. Indeed, this is the reason why the inhabitants of Europe are more courageous than those of Asia. Conditions which change little lead to easy-going ways; variations to distress of body and mind. Calm and an easy-going way of living increase cowardice; distress and pain increase courage. That is one reason for the more warlike nature of Europeans. But another cause lies in their customs. They are not subjects of a monarchy as the Asiatics are and, as I have said before, men who are ruled by princes are the most cowardly. Their souls are enslaved and they are unwilling to risk their own lives for another's aggrandisement. On the other hand, those who govern themselves will willingly take risks because they do it for themselves. They are eager and willing to face even the worst of fates when theirs are the rewards of victory. It is clear, then, that the tradition of rule has no small influence on the courage of a people.

24. In general it may be said that these are the differences

between Europe and Asia. There exist in Europe, then, people differing among themselves in size, appearance and courage, and the factors controlling those differences are those I have described. Let me summarize this plainly. When a race lives in a rough mountainous country, at a high elevation, and well watered, where great differences of climate accompany the various seasons, there the people will be of large physique, well-accustomed to hardihood and bravery, and with no small degree of fierceness and wildness in their character. On the other hand, in low-lying, stifling lands, full of meadows, getting a larger share of warm than cold winds, and where the water is warm, the people will be neither large nor slight, but rather broad in build, fleshy and black-haired. Their complexions are dark rather than fair and they are phlegmatic rather than bilious. Bravery and hardihood are not an integral part of their natural characters although these traits can be created by training. The people of a country where rivers drain the surface water and rain water have clear complexions and good health. But where there are no rivers and the drinking water is taken from lakes or marshes, the people will necessarily be more pot-bellied and splenetic. People who live in countries which are high, level, windswept and rainy tend to be of large stature and to show little variation among themselves. They are also of a less courageous and less wild disposition. In countries where there is a light waterless soil devoid of trees and where the seasons occasion but small changes in climate, the people usually have hard sinewy bodies, they are fair rather than dark and they are strong-willed and headstrong in temperament. Places where changes of weather are most frequent and of the greatest degree show the greatest individual differences in physique, temperament and disposition among the inhabitants.

The chief controlling factors, then, are the variability of the weather, the type of country and the sort of water which is drunk. You will find, as a general rule, that the constitutions and the habits of a people follow the nature of the land where they live. Where the soil is rich, soft and well-watered and where surface water is drunk, which is warm in summer and

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cold in winter, and where the seasons are favourable, you will find the people fleshy, their joints obscured, and they have watery constitutions. Such people are incapable of great effort. In addition, such a people are, for the most part, cowards. They are easy-going and sleepy, clumsy craftsmen and never keen or delicate. But if the land is bare, waterless and rough, swept by the winter gales and burnt by the summer sun, you will find there a people hard and spare, their joints showing, sinewy and hairy. They are by nature keen and fond of work, they are wakeful, headstrong and self-willed and inclined to fierceness rather than tame. They are keener at their crafts, more intelligent and better warriors. Other living things in such a land show a similar nature. These, then, are the most radically opposed types of character and physique. If you draw your deductions according to these principles, you will not go wrong.

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The importance of being able to foretell the course of an illness, and an account of the significance of various signs.

1. It seems to be highly desirable that a physician should pay much attention to prognosis. If he is able to tell his patients when he visits them not only about their past and present symptoms, but also to tell them what is going to happen, as well as to fill in the details they have omitted, he will increase his reputation as a medical practitioner and people will have no qualms in putting themselves under his care. Moreover, he will the better be able to effect a cure if he can foretell, from the present symptoms, the future course of the disease.

It is impossible to cure all patients; that would be an achievement surpassing in difficulty even the forecasting of future developments. But seeing that men die before the physician is able to bring his skill to grapple with the case — some owing to the violence of the disease die before they have summoned the doctor, some as soon as he arrives; some live one day, others a little longer — in view of this, an understanding of such diseases is needed. One must know to what extent they exceed the strength of the body and one must have a thorough acquaintance with their future course. In this way one may become a good physician and justly win high fame. In the case of patients who were going to survive, he would be able to safeguard them the better from complications by having a longer time to take precautions. By realizing and announcing beforehand which patients were going to die, he would absolve himself from any blame.

2. The signs to watch for in acute diseases are as follows. First study the patient's *facies*; whether it has a healthy look and in particular whether it be exactly as it normally is. If the patient's normal appearance is preserved, this is best; just as the more abnormal it is, the worse it is. The latter appear-

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ance may be described thus: the nose sharp, the eyes sunken, the temples fallen in, the ears cold and drawn in and their lobes distorted, the skin of the face hard, stretched and dry, and the colour of the face pale or dusky. Now if at the beginning of an illness the face be such and one's judgement lacks confirmation from other signs, the patient should be asked whether he has suffered from insomnia, from severe diarrhoea, or if he has ravenous hunger. If he admits to any of these things, the case must be judged less severe than if it were otherwise, for where the facial appearance is due to any of these causes a crisis will be reached in a day and a night. But if he admits none of these things, and if there is no improvement within the prescribed time, it must be realized that this sign portends death.

Should the illness have passed the third day before the face assumes this appearance, the same questions as I mentioned before should be asked, and an examination of the whole body made for other signs, paying particular attention to the eyes. For if they avoid the glare of light, or weep involuntarily, or squint, or the one becomes smaller than the other, or if the whites are red or livid or show the presence of tiny dark veins, or if clearness appear around the eyes, or if the eyes wander, or project, or are deeply sunken, or if the whole complexion of the face be altered; then all these things must be considered bad signs and indicative of death.

The appearance of the eyes in sleep should also be noted, for if some of the white shows when the eyes are closed, so long as it is not due to diarrhoea, the taking of drugs, or the normal habit in sleep, it is a bad sign and especially fatal. If the eyelid becomes swollen or livid, or likewise the lip or the nose, together with one of the other signs, it may be known that death is at hand. It is also a fatal sign if the lips are parted and hang loose and become cold and white.

3. When the physician visits the patient, he should find him lying on one side or the other, with his hands, neck and legs slightly bent, and with the whole body lying relaxed. For this is how most healthy people lie. The best manner of lying in bed is that which most nearly resembles the manner of healthy

people. It is not so good if the patient lies on his back with his hands and legs extended; while if he should have fallen forwards away from the bed towards his feet, that is worse still.

If he should be found with his feet uncovered, unless they are exceptionally warm, and with his hands and legs flung about at random, it is a bad sign because it is evidence of restlessness.

It is a fatal sign to sleep with the mouth continuously wide open, and if the patient lies on his back with his legs very much bent and intertwined. It is also bad if a patient sleeps on his stomach unless this is his normal habit when well; such a posture indicates delirium or abdominal pain.

For the patient to want to sit up when the disease is at its height is a bad sign in all acute diseases, but worst of all in cases of pneumonia. For a patient with fever to grind his teeth, unless this be a habit continued from childhood, is a sign of madness and death. If this occurs during delirium, it is a sign that the disease has already taken a fatal turn.

Inquiries should be made about any sore which has been discovered to ascertain whether it existed prior to the illness, or whether it has developed during the course of the illness. For, if the patient is about to die, before death the sore will become either livid and dry or pale and hard.

4. The following points about the gestures of the hands should be noted. In cases of acute fever or of pneumonia and in brain-fever and headache, it is a bad sign and portends death if any of the following things are noted: if the hands are waved in front of the face, or make grabs at the air, or pull the nap off cloth, or pull off bits of wool, or tear pieces of straw out of the wall.

5. Rapid breathing indicates either distress or inflammation in the organs above the diaphragm. Deep breaths taken at long intervals are a sign of delirium. If the expired air from the mouth and nostrils is cold, death is close at hand. Regular respiration is to be considered a most important indication of recovery in all the acute diseases which are accompanied by fever and reach the crisis within forty days.

6. Fits of sweating are excellent in all acute diseases when they occur on the critical days, and mark the final end of the

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fever. They are also good when the whole body is involved, and show that the patient is taking the disease more easily. But those which conform to neither of these circumstances are of no advantage. The worst kinds of sweating are those which are cold and occur only round the head and neck; these, if accompanied by a high fever, mean death; if by a milder fever, a long illness.

7. The most satisfactory condition of the hypochondrium is when it is painless, but is soft and smooth on both sides. On the other hand, precautions must be taken if it is inflamed and painful, or taut, or if there is a difference in level between the two sides. Should there also be a throbbing in the hypochondrium, it is a sign of violent disturbance or delirium. In such cases, the appearance of the eyes should be noted; if the eyes move rapidly, it is highly probable that the patient is mad.

A hard and painful swelling of the hypochondrium which involves the whole of that area is a very bad sign. If it be only on one side, it is less fraught with danger if it is on the left side. When such swellings are present at the beginning of an illness, it is an indication of the danger of a speedy death; but if the patient lasts more than twenty days while the fever continues and without the swelling subsiding, then it will suppurate. In these cases, a violent epistaxis occurs during the first period and this is very helpful, but the patient should be asked whether he has a headache, or if his sight is dim. If either of these symptoms were present, it would incline to provoke the epistaxis. Epistaxis is more likely to occur in patients under the age of thirty-five.

Swellings which are soft, painless and pit on pressure with the finger, cause delayed crises but are less to be feared than the former kind. But if the fever continue for more than sixty days without the swelling subsiding, then an empyema is being formed. The same is also true of swellings in the belly.

In brief, then, painful hard large swellings mean danger of a speedy death; soft, painless swellings which pit on pressure mean protracted illness.

Swellings in the belly are less likely to be productive of abscess than those in the hypochondria, and those below the

navel are the least likely to suppurate. Epistaxis is particularly to be expected in association with swellings in the upper parts. Whenever a swelling lasts a long time, the formation of an empyema at that site must be expected.

When suppuration occurs, the following points should be noted. Of those which point externally, the best sort are those which are small, bulge outwards as much as possible and come to a sharp head. The worst sort are those which are large and flat, and which do not come to anything like a sharp head. Of those which burst internally, the best are those which have no connection with the exterior, and which are localized, painless and show a uniform colouring all over the external surface. The best sort of pus is that which is white, smooth, homogeneous and least foul-smelling. That of the opposite sort is the worst.

8. All cases of dropsy arising from acute diseases are bad. For, besides not getting rid of the fever, they are particularly painful and liable to cause death. In most cases dropsy starts from the flanks and the loins, but sometimes from the liver. In those cases where the dropsy starts from the flanks and loins, the feet swell and long-lasting diarrhoea occurs which neither puts an end to the pain in the flanks and loins nor empties the belly. Where it arises from the liver, they have a desire to cough but produce no sputum worth mentioning, their feet swell, they pass nothing from the bowels but hard and painful stools passed with an effort, and swellings appear around the belly which come and go, sometimes on the right and sometimes on the left.

9. It is a bad sign if the head, hands and feet are cold while the belly and sides are warm. It is best that the body should be warm all over and equally soft.

The patient should turn over easily and be light when lifted up. If he should appear rather heavy, in the hands and feet as well as in the rest of the body, there is greater danger. If, in addition to this heaviness, the nails and fingers become livid, death is immediately to be expected. But if the fingers or the feet become completely black, this is less fatal than if they are livid. Nevertheless, other signs should be taken into considera-

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tion as well, for if the patient appears to be bearing up well under the disease, or if he displays in addition to this any of the signs which betoken recovery, it is probable that the disease will result in abscess formation with survival of the patient, although those parts will be lost which have turned black.

Drawing up of the testicles or private parts indicates distress or death.

10. As regards sleep, the patient should follow our natural habit and spend the day awake and the night asleep. If this habit be disturbed, it is not so good. Nevertheless, it is better that he should sleep during the morning and early afternoon than later. It is worst of all when he sleeps neither night nor day; it may be that pain and distress is keeping him awake, or this sign of insomnia may precede delirium.

11. It is best when the stools are soft and formed, and passed at the hour customary to the patient when in health; their bulk should be proportionate to the amount of food taken. Such stools indicate a healthy condition of the lower bowel. But if the stools be fluid, it is best that they should not be accompanied by a noise, nor passed in small quantities at frequent intervals; the continual getting up is exhausting for the patient and prevents him from sleeping. If he should pass large stools frequently, there is a risk of his fainting. He should, according to how much he eats, pass stools two or three times during the day and once during the night. The larger stool should be passed in the morning as he was accustomed. The stools should become more solid towards the crisis when the disease is being cured. They should be light brown and not too foul-smelling. It sometimes happens that round worms are passed with the stools toward the crisis when the disease is being cured.

In every illness, the belly should be loose and the stools of good size. It is a bad sign if the stools are very watery, or white, or particularly yellowish or frothy. It is also bad if they are small, sticky, white, yellowish and smooth. Signs more indicative of death are when they are dark, or livid, or oily, or rust-coloured and foul-smelling. Variety in the stools denotes a longer illness, but is no less a sign of a fatal outcome. Such

stools are those which are full of shreds, bloody, bilious, green and dark stools; sometimes such constituents are passed together, sometimes separately.

It is best to emit wind without a noise or breaking wind; but it is better to emit it even with a noise than to repress or smother it. All the same, wind emitted in this manner indicates that there is something wrong internally, or that the patient is delirious, if, at least, the emission of wind is involuntary.

Pains and swellings in the hypochondria, if they are fresh and not accompanied by inflammation, are dispersed by a rumbling gathering of wind in the hypochondrium, especially if it be passed through the body and voided with the stools and urine. It may be passed through by itself. It is also a good thing if the gathering of wind moves down to the lower regions.

12. Urine is best when there is a white, smooth, even deposit in it the whole time up to the crisis of the disease, for this indicates recovery and a short illness. If there should be intervals when clear urine is passed, and the white, smooth, even deposit appears only at times, this means that the illness will be prolonged and that recovery is less certain. If the urine should be pink with a pink smooth sediment, although such indicates an illness even longer than in the previous case, it is a certain sign of recovery. Sediment like barley-meal in the urine is bad, and it is even worse if the sediment resembles flakes. Thin white sediment is a very bad sign, and it is even worse if it resembles bran. Clouds suspended in the urine constitute a good sign if they are white, a bad one if they are dark.

So long as the urine is thin and yellowish-red, the disease is not ripened. If the illness is prolonged and the urine remain of that colour, there is a danger that the patient may not last out till ripening occurs. Urine which is foul-smelling or watery or dark or thick is more a sign of death. In the case of men and women, dark urine is worst; in the case of children, watery urine.

When a patient continues to pass thin raw urine for a long time and the other signs indicate recovery, the formation of

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an abscess should be expected in the parts below the diaphragm.

When grease forms patterns like cobwebs on the surface of the urine, this constitutes a warning, for it is a sign of wasting. When urine contains clouds, it should be noted whether they are towards the top or the bottom, and what is their colour. Those which sink and have the colours previously mentioned as favourable are to be judged a good sign. Those which rise and have the colour said to be unfavourable constitute a bad sign. You must not be deceived if these appearances result merely from a diseased condition of the bladder, for they may then indicate not a disease of the whole body, but merely of that organ.

13. The most helpful kind of vomiting is that in which the matter brought up consists of phlegm and bile, as well-mixed as possible, and is neither thick nor particularly great in quantity. If it is not well-mixed, it is less good. The vomiting of dark green, livid or dark material, no matter which of these colours, must be considered a bad sign. If the same patient should vomit material of all these colours, his condition is already fatal. The quickest death is denoted by the vomiting of livid matter if it has a foul smell. All rotten and foul odours coming from vomited material are bad.

14. In all diseases which affect the lungs and sides, sputum should be brought up early and, in appearance, the yellow matter should be thoroughly mixed with the sputum. It is not so good if it only comes about some while after the beginning of the pain, that the sputum is brought up and it is yellow, or light brown, or the cause of much coughing, or if it be not thoroughly mixed. It is a sign of danger if the yellow matter is not diluted; and white, sticky and nummular sputum is not beneficial. It is worse if it should be a marked pale green and frothy. If it should be so undiluted as to appear dark, this is even worse still. It is also bad if the lungs are not cleared and nothing is produced, but the throat remains full of bubbling matter.

In all diseases of the lungs, running at the nose and sneezing is bad, whether it existed before the illness or supervened during its course. But in other diseases which are likely to

prove fatal, sneezing is beneficial. In cases of pneumonia, the production at the beginning of the illness of yellow sputum mixed with a little blood is a good indication of recovery. But when this occurs on or after the seventh day, it is less certainly good. All sputa are bad which do not relieve the pain; the worst are those which are dark in colour as stated above. The production of any sputum which relieves pain is rather better.

15. When aches arising in these regions are not relieved by the production of sputum or evacuation of the bowels, or by venesection or the administration of drugs and special regimens, you must know that an empyema is present. Those empyemas which begin to suppurate while the sputum is still bilious are especially signs of a fatal issue, whether the bilious matter is brought up separately from the pus or together with it.

Most specially, if the empyema appears to start from sputum of this sort when the disease is in its seventh day, the patient who brings up such sputum may be expected to die on the fourteenth day, unless a good sign makes its appearance. The good signs which may appear are these: to bear the illness easily, to have good respiration, to be free from pain, to cough up sputum easily, to have the body evenly warm and soft all over, not to suffer from thirst, to have the urine, stools, sleep and sweating of the types described above as good. If all these signs appear the patient is not likely to die; but if only some of these signs appear, he may die although he will live longer than fourteen days. The opposites of these are bad signs: to bear the illness hardly, to draw deep and frequent breaths, to suffer continued pain, to have difficulty in coughing up sputum, to have violent thirst, to have the body unevenly warm with the abdomen and sides very warm and the forehead, hands and feet cold, to have the urine, stools, sleep and sweating of the types described above as bad. If any of these signs appear subsequent to the bringing up of sputum of this description, the patient may die in less than fourteen days, either on the ninth or eleventh. This is the inference which should be drawn from observing this kind of sputum; it is

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particularly likely to indicate death and may not give the patient his fourteen days.

The most reliable forecast is that which takes into account the good and the bad signs which appear in addition. Other empyemata burst as a rule, some on the twentieth day, some on the fortieth and some reach sixty days.

16. The beginning of an empyema may be reckoned for calculation from the day on which the patient first had a fever, or when he had a rigor, or when he said that a heaviness replaced the pain in the spot where he feels discomfort. These things occur at the start of an empyema. The discharge of pus must be expected according to the stated intervals reckoned from this day.

In cases where the empyema is unilateral, the patient should be made to turn over on the side affected and then asked whether he has an ache in that side. Or, if one side be hotter than the other, he should be made to lie on the healthy side and then be asked if he feels as if a weight were hanging on him from above. If such is the case, the empyema is on whichever side the heaviness is felt.

17. All empyemata may be recognized by the following signs. First of all, the fever does not intermit, but remitting a little during the day, becomes more acute at night. Many fits of sweating occur. A desire to cough is aroused, but nothing is brought up to speak of. The eyes become sunken, and the cheeks are flushed. The finger-nails become curved and the fingers become warm, especially at their tips. Swellings which come and go are observed in the feet. Blisters form on the body and the patients show no desire for food.

Chronic empyemata show these signs and considerable reliance may be placed in them. Those which will not last long are indicated by their showing the sort of signs which appear at the start of the empyema, and also by the patient suffering somewhat from difficulty with breathing. Whether it will burst sooner or later may be determined from the following signs - if pain occurs at the beginning, and dyspnoea, cough and expectoration continue, bursting may be expected

in twenty days or even less. If the pain be less acute and the other signs are normal, bursting may be expected after twenty days. Pain, dyspnoea and expectoration must always precede the evacuation of pus.

Patients with empyema who are most likely to survive are those whom the fever leaves on the same day as the abscess bursts, and who quickly regain their appetite, lose their thirst and who pass small firm stools, and from whom white smooth pus, all of the same colour and unmixed with phlegm, flows out and is cleared away without pain or coughing. These are the best signs and patients who show them speedily recover, and failing these, the best signs are their nearest approximations.

Those patients die when the fever does not leave them on the same day as the abscess bursts, but in whom, after an apparent departure, it reappears and gives them a high fever. They suffer from thirst, lack of appetite and diarrhoea, and the pus is greenish-yellow and livid, or phlegmatic and frothy. When all these signs appear, death is certain; when some appear, but not all, the patient may die or he may recover after a prolonged illness. But indications should be drawn not only from the special signs concerned with the empyema itself, but also from all the other signs as well.

18. When abscess formation from pneumonic conditions occurs near the ears and suppurates downwards with the production of a fistula, the patient recovers.

Some complications must be suspected under the following conditions: if the fever is continuous and the pain incessant, if the sputum does not appear normal, and if the stools are neither bilious nor loose and homogeneous, if the urine is not thick and containing much sediment. In such cases, if the other signs of recovery are favourable, the formation of abscesses can be expected. These sometimes occur in the lower regions, in cases where some of the phlegm is located near the hypochondrium; sometimes in the upper regions where the hypochondrium remains soft and painless. In such cases, the patient, having for some time suffered from dyspnoea, regains normal respiration without any apparent cause.

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Abscess formation in the legs is always beneficial in severe and critical cases of pneumonia, but most specially so when it follows a change in the nature of the sputum. For if the swelling and pain come on when the sputum has become purulent instead of yellow and when it is being expectorated, this constitutes the surest sign that the patient is going to recover and that the abscess will quickly become painless and resolve. But if the sputum is not expectorated well and urine with a satisfactory sediment does not appear, there is a danger that the limb may become lame or give a good deal of trouble.

If the abscess disappears without any expectoration of sputum while the fever continues, it is a bad sign for there is a danger that the patient may become delirious and die.

It is the older people who are more likely to die when empyemata complicate pneumonia, whereas in the case of empyema from other causes, death is more frequent among younger people.

19. When pain accompanied by fever attacks the loins and lower regions, they are specially fatal if the pain leaves the lower regions and fastens on the diaphragm. Attention should therefore be paid to the other signs. If another bad sign appears as well, the case is hopeless. But if other bad signs do not appear when the pain leaps up to the diaphragm, there is a good chance of an empyema forming.

It is always a bad sign if the bladder becomes hard and painful; most fatal if this is accompanied by continuous fever. The distress occasioned by the bladder alone is enough to kill the patient, while the bowels remain unopened under such circumstances except for the forcible passage of hard matter. The passage of urine resembling pus with a white smooth sediment terminates the condition. If there is no improvement in the urine and the bladder does not become soft, and if the fever is continuous, the patient is likely to die early in the disease. This condition occurs most frequently in children between the ages of seven and fifteen.

20. Fevers reach their crises in the same number of days whether the patient survives or dies. The mildest fevers, and those which give the surest indications of recovery, cease on

or before the fourth day. Those which are the most severe and accompanied by the worst signs cause death on the fourth day or earlier. The first bout of a fever ends in this period, the second lasts until the seventh day, the third till the eleventh day, the fourth till the fourteenth day, the fifth till the seventeenth day, the sixth till the twentieth day. In the case of most acute diseases, the bouts continue for twenty days, each bout adding four days at a time. But none of these periods can be computed in whole numbers exactly; neither the solar year nor the lunar month are of such a length as to be counted in whole numbers of days.

Subsequently, addition continues in the same way so that the first period contains thirty-four days, the second forty days and the third sixty days. It is very difficult to distinguish at the beginning between those fevers which are going to reach a crisis in a long period for they are very much alike in the way they start. However, the possibility should be borne in mind from the first day and reconsidered every time a period of four days is added and then the way in which the disease is developing will not escape you. Quartan fevers too follow the same pattern.

Those fevers which are going to reach the crisis in a short time are easier to recognize, for they show considerable differences from the start.

The patients who are going to recover have good respiration and no pain, they sleep at night and display other signs of recovery. Those who are going to die have dyspnoea, insomnia and delirium, and display other very bad signs. Thus, once this is recognized, calculations must be made which are based on the period and the appropriate additions as the disease moves towards its crisis. The crises which women undergo after childbirth follow the same plan too.

21. Severe continuous headache accompanied by fever is a certain sign of death if any of the other fatal signs occur as well. If there are no such signs, but the headache lasts more than twenty days while the fever continues, an epistaxis or some other abscession to the lower regions should be expected. An epistaxis or empyema may also be expected while the

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headache is still young, especially if it is temporal or frontal. Epistaxis is more likely with patients under thirty-five; empyema with older men.

22. Acute earache accompanied by continuous and severe fever is a bad sign; there is a danger that the patient may become delirious and die. In view of the dangerous nature of this condition, special attention must be paid from the first day to any other signs. Younger men die on the seventh day or sooner from this malady; older men much more slowly for they are less liable to fever and delirium and for this reason their ears suppurate before they reach a fatal stage. Nevertheless, at such ages, relapse is usually fatal. The younger men die before the ear suppurates. When white pus flows from the ear, there is a chance that a young man may recover if some other good sign appears as well.

23. An ulcerated throat accompanied by fever is a bad sign and, if any other sign of those previously mentioned as bad appears as well, it may be said in advance that the patient is in danger. The worst kind of sore throat, and that which carries off those who suffer from them most quickly, is that which shows no obvious sign either in the throat or in the neck, but produces excessive pain and orthopnoea. Suffocation occurs on the first, second, third or fourth day. Those cases which are in other respects very similar and suffer pain, but in which the throat swells up and becomes inflamed, are also very fatal but the disease is more protracted than the previous sort.

When both the throat and the neck are inflamed, these sore throats last longer. Those suffering from them recover especially if a rash appears on the neck and chest and the erysipelas does not turn inwards. If the erysipelas does not disappear in the critical number of days, or if an external swelling does not appear, or if pus is not coughed up easily and without distress, this constitutes a sign of death or of a relapse of the inflammation. It is safest when the erysipelas turns outwards as much as possible; if it turns towards the lungs, it causes delirium and empyema usually follows.*

24. A relapse is to be expected in those cases where a fever

*A short passage which seems to be an interpolation is omitted here.

departs either without any sign of resolution appearing or if it departs on days other than the critical ones. Whenever a fever is prolonged while the patient appears likely to recover and suffers no pain by reason of any inflammation or any other apparent cause, an abscession accompanied by swelling and pain into one of the joints, most probably one of the lower ones, should be expected. Such abscessions occur particularly and in a shorter time in patients under the age of thirty years.

The formation of an abscession should be suspected at once if the fever lasts more than twenty days without remission. This is less likely to happen with older people in whom the fever lasts longer. If the fever is continued, such an abscession should be expected, but if it intermits and attacks in an irregular fashion and continues thus till autumn is at hand, it is likely to develop quartan periodicity. Just as people under thirty are specially liable to abscession, so those above that age are specially liable to quartan fevers.

It should be observed that during the winter abscessions are more likely and take longer to depart, but they are less liable to return.

When a patient with a fever which is unlikely to cause death professes a headache and a blackness before the eyes, or if heartburn accompany this, bilious vomiting will occur. If a rigor occurs as well, and the parts below the diaphragm are cold, vomiting will occur even sooner. If the patient takes any food or drink at this time, it will very quickly be brought up again. When such distress begins on the first day, the greatest distress will be on the fourth and fifth days; recovery will be about the seventh. In most cases, however, distress begins on the third day and the disease reaches its height on the fifth, departing on the ninth day or on the eleventh. When the distress begins on the fifth day, and in other respects the condition is similar to that previously described, the crisis occurs on the fourteenth day. These symptoms are specially common in tertian fevers in the case of adults. Younger people do suffer from them in tertians too, but more often in more continued fevers and genuine tertians.

When in this kind of fever the patient complains of headache,

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but instead of darkness before the eyes his sight becomes dim or is dazzled, and instead of heartburn there is contraction of the hypochondrium on one side or the other unaccompanied by either pain or inflammation, epistaxis is more likely to occur than vomiting. Even so, epistaxis is more probable in the young; those over thirty are less liable to it, but more liable to vomiting.

Children are likely to have convulsions if the fever is high and if they are constipated, if they are wakeful, frightened, cry and change colour, turning pale, livid or red. This most commonly happens in children under the age of seven. As they grow up and reach adult years, they are no longer likely to be attacked by convulsions in the course of a fever, unless one of the most severe and worst signs appears as well, as happens in inflammation of the brain. Whether the children and the others will recover or die must be judged by the whole total of signs as described in each case.

This concludes my remarks on acute diseases and those arising from them.

25. Anyone who is to make a correct forecast of a patient's recovery or death, or of the length of his illness, must be thoroughly acquainted with the signs and form his judgement by estimating their influence one on another, as has been described in speaking of urine, sputa and other subjects. The physician must be quick to think of the trend of any diseases that are epidemic from time to time, and the climatic conditions must not escape him. It should, however, be observed that the indications and signs have invariably the same force, the bad being always bad and the good good, in every year and under all climatic conditions. The truth of those described in this treatise has been proved in Libya, in Delos and in Scythia. It should therefore be realized that there is nothing remarkable in being right in the great majority of cases in the same district, provided the physician knows the signs and can draw the correct conclusions from them. There is no point in seeking the name of any disease which has not been mentioned, for all which reach their crisis in the periods described may be recognized by the same signs.

REGIMENT IN ACUTE DISEASES

The effect of various regimens upon an ailing body. Apparently a polemic treatise written to refute certain doctrines held by the neighbouring school of medicine at Cnidus.

1. The authors of the book called *Opinions from Cnidus* have given a correct account of the symptoms in patients suffering from various diseases and, in some cases, of the ultimate effects of the disease. Thus far indeed anyone might go, if he inquired diligently of each patient what his symptoms were, without being a physician. But these authors have omitted a great deal of what the physician should learn from his patient without his telling him; details which vary from case to case but the interpretation of which may sometimes be of vital importance.

2. Whenever their interpretation of the symptoms leads them to prescribe a cure, my opinions differ from theirs very considerably. Nor is this the only criticism I have to make, for, in addition, they employ too few remedies. Thus, apart from acute diseases, they generally prescribe opening medicine and recommend their patients whey and milk to drink.

3. Of course, if these remedies were satisfactory and were adapted to the diseases for which they were prescribed, I should think very highly of them, seeing that so few were sufficient. But this simply is not the case. Later writers, however, have approached the subject in a more scientific way and enumerated the diets to be given to patients in various diseases. But no one so far has written any considerable work on regimen in general, although this is a most important omission. Some of these authors were not unaware of the multiplicity of the different ways in which each disease may present itself; but they made mistakes when they tried to set down clearly the number of individual diseases. It is not easy to count accurately if a different name is given to every morbid condition differing but slightly from another; and unless a disease has the same name in all its forms it will appear to be a different disease.

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4. I believe that attention should be paid to all the details of the science [of healing]. Measures requiring to be done well and exactly must be performed well and exactly; where speed is essential, with speed; where cleanliness is required, with cleanliness; and where pain is to be avoided, the patient should be treated so as to cause the minimum of pain. All such things should be done considerably better by the physician than by another.

5. I would single out for praise the physician who particularly excels in the treatment of acute diseases, for these cause the greatest number of deaths. By acute diseases are meant the conditions which earlier doctors have named pleurisy, pneumonia, brain-fever and *causus*, and conditions resembling them which usually show continued fever. For in the absence of an epidemic of a disease of the plague type, when the cases of illness are scattered, many more die of these conditions than all the others together.

6. Laymen, far from recognizing those who excel in the treatment of acute diseases, generally praise or blame any cure that is different. A good indication that the common people are at their most unintelligent in discussing these diseases, is that such cases give quacks their reputations as physicians. It is easy enough to learn the names of the things given to treat such patients, and if anyone talks of barley water, or of such and such a wine, or of hydromel, the layman thinks that all doctors, both good and bad, mean exactly the same thing. On the contrary, it is in such matters that their differences are clearly shown.

7. It seems to me worth while recording facts which in spite of their importance are not generally known to the medical profession, and to state what is harmful and what beneficial in the treatment of patients. For instance it is not generally known why some physicians all their lives give their patients gruel which is unstrained, thinking this is the right way to effect a cure; while others regard it as of the highest importance that the patient should not swallow a single grain of barley, as they think this causes great harm, but strain the barley-water through a linen cloth before giving it to their patients. Some

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again give neither gruel nor barley-water; others give it only during the first seven days of the disease and yet others give it till the crisis be reached.

8. Physicians are quite unaccustomed to propound such questions, and perhaps they do not appreciate them when they are propounded. The science of medicine has fallen so low in popular estimation as not to seem the science of healing at all. As a result, if, in the acute diseases at least, practitioners differ so widely that the diet prescribed by one is regarded as bad by another, the science could almost be compared to divination. Seers think the same bird to be of good omen if it appears on the left and bad if it appears on the right, while other seers hold exactly the opposite view; and there are similar contradictions in divination by inspection of an animal's entrails.

9. I assert that this study of regimen is much to be recommended, and it is something closely allied to the most numerous and the most vital studies which compose the science of medicine. To the sick it is a powerful aid to recovery, to the healthy a means of preserving health, to athletes a means of reaching their best form and, in short, the means by which every man may realize his desire.

10. Barley-gruel seems to have been correctly selected as the most suitable cereal to give in these acute diseases and I have a high opinion of those who selected it. Its gluten is smooth, consistent and soothing; and is slippery and fairly soft; it is thirst-quenching and easily got rid of in case this be necessary. It contains nothing to produce constipation or serious rumbling, nor does it swell up in the stomach for during cooking it swells up to its maximum bulk.

11. Patients who take gruel in these diseases should not, as a general rule, fast on any day. They should take it without interruption unless the use of a purge or an enema renders a break necessary. Those who are accustomed to two meals a day should be given gruel twice daily; those who are accustomed to take only one meal a day should take gruel once only on the first day and thereafter it is permissible to increase this gradually and to give it twice a day if there seems to be any need for it. At the beginning of an illness it should be given

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sparingly, nor should it be very thick; in fact, the patient should take only as much as he requires to allay an empty feeling.

12. If the disease is drier than one would like, the patient should be given a drink of either hydromel or wine – whichever is appropriate, and this will be discussed later – before the gruel, and increases in the quantity of gruel should be avoided. But if the mouth is moist and the pulmonary secretions are produced properly, the quantity of gruel should, as a general rule, be increased. For the sooner moist discharges appear and the more pronounced they are, the sooner will the crisis come, whereas delay in their appearance means that the crisis too will be delayed. Such is the general rule on these particular points.

13. There are many other important signs by which prognosis may be made; they will be passed over now to be treated later. The larger the stools, the more nourishment should be given until the crisis. This is specially so at the crisis and then extra large amounts should be given for the next few days. At least, this regimen should be adopted in those cases in which the crisis appears to take place on the fifth, seventh or ninth day; by so doing, precautions will have been taken for the following even day as well as the odd day of the crisis. Later, gruel should be given at first, giving place in time to solid food.

14. This treatment is generally successful if thick gruel is taken from the beginning. In cases of pleurisy, the pain stops spontaneously as soon as the patient begins to bring up any considerable amount of sputum and to be purged. Evacuation of discharges is much more complete and empyema less likely to occur on this regimen than if a different diet were taken. The crisis is more simple, more easily reached and less liable to be followed by a relapse.

15. The best barley should be used for gruel and it should be cooked as well as possible, especially if you intend to use only the barley-water. Apart from its other excellencies, the slipperiness of gruel makes the barley itself quite safe to swallow, for it does not adhere or lodge anywhere in its passage through the thorax. It is most slippery, thirst-quenching,

easily digested and weakest if it is really well cooked; all of which qualities are desirable.

16. A course of dieting on such gruel may be very harmful unless measures are taken to make it sufficient. Thus, if a patient has food retained in the stomach it will, unless he be made to evacuate some of it before being given gruel, only exacerbate any pain he already has, or give him one if he has none, and it will make respiration more rapid. This is bad because it dries up the lung and causes distress in the hypochondrium, the abdomen and diaphragm. Moreover, no gruel should be given to patients in whom the pain in the side be persistent in spite of warm fomentations, while the sputum is viscid and unripe and retained, unless the pain be relieved by relaxing the bowels or by cutting a vein, whichever may be indicated; if gruel is given to patients in such a condition, they will very quickly die.

17. For these and other similar reasons those who take thick gruel die within a week; in some cases after partly going out of their minds, in others choked by orthopnoea and stertorous breathing. It used to be thought that such patients had been the subject of a stroke, particularly because when they died the side was livid like a bruise. The reason for this appearance is that they die before the pain is allayed, for difficulty in breathing quickly sets in. Because the sputum becomes viscid and unripened, expiration is impeded causing wheezing in the bronchial tubes and thus, as has already been said, increased frequency of the respiration leads rapidly to asthma. When a patient reaches this condition, his case is generally desperate. The retained sputum actually prevents the intake of breath and forces it quickly to be expelled. Thus one thing is added to another. The retained sputum increases the rate of respiration and this in itself makes the sputum viscid so that it cannot run away. This may happen not only as the result of the untimely taking of gruel, but much more so if the patient eats or drinks anything less suitable.

18. In most respects, the additional precautions to be observed are the same whether the gruel is taken thick or strained to make barley-water. If neither of them, but only

drink is taken, the treatment to be given is sometimes different. The general rules are as follows.

19. If the fever begins soon after the patient has taken a meal and the bowels have not been opened, whether it be accompanied by pain or not, the diet of gruel should be withheld until it is judged that the food has passed to the lower part of the intestines. Fluids should be given and oxymel is recommended if there is pain, hot in winter and cold in summer. If there is acute thirst, hydromel and water may also be taken. If there is pain or any of the dangerous signs appear, but only after the seventh day or if the patient be strong, then gruel should be given. Should there be no evacuation of food previously consumed after recent food has been taken, an enema should be given to patients who are strong and in the prime of life; patients who are too weak should be given a suppository unless the bowels are opened satisfactorily of their own accord.

20. There is one time both at the beginning and, indeed, throughout the illness when gruel should not be given and that is when the feet are cold. It is then specially important not to administer any fluids, as well as to withhold gruel. But when warmth descends to the feet, then it may be given. It must be remembered that this is a time of great importance in all diseases, and not least in acute diseases and those accompanied by fever. Barley-water especially and gruel too should not be given without accurate observation of the signs which have been mentioned.

21. A pain in the side, whether it appears at the beginning of the illness or at a later stage, should first be treated in the ordinary manner in an attempt to remove it by hot fomentations. The best type of fomentation is hot water in a skin or bladder, or in an urn of bronze or earthenware. For comfort, something soft should first be put against the side. It is also good to apply a large soft sponge which has been dipped in hot water and wrung out. The warm object should be protected on top as in this way it stays hot longer and this also prevents steam reaching the patient's nostrils, unless of course this is regarded as beneficial; there are occasions when it is

needed. Barley and vetch may also be used if mixed with a little vinegar, sharper than one would drink, to soften it. It is then heated and sewn up in bags which are applied. Bran may be used in the same way. For dry fomentations, salt or millet is best, baked in woollen bags; millet is light and comforting.

22. Such a softening process also removes aches that extend up to the clavicles. Bleeding is not so efficacious in relieving pain. If the distress is not relieved by hot fomentations, heating should not be long continued as this dries up the lungs and causes empyema. If the pain causes a heavy feeling spreading towards the clavicle or arm, or about the breast or above the diaphragm, the inner vein at the elbow should be cut and you should not be afraid of drawing a large quantity of blood until, instead of running clear and red, it becomes either much redder or turns livid; either of these may happen.

23. If the pain is below the diaphragm and does not seem to extend towards the clavicles, the belly should be softened with either black hellebore or purple spurge, adding to the black hellebore, parsnip, seseli, cummin, anise or some other fragrant herb, and to the purple spurge the juice of silphium. These are also similar in effect if mixed with each other. But black hellebore gives a better evacuation and one more likely to produce a crisis, while purple spurge is better for breaking up wind. Both stop pain as do many other purgatives, but they are the best of those I know. Purgatives administered in the gruel are also helpful, so long as they are not too unpleasant owing to bitterness or any other unpleasant taste, or owing to the size of the dose or colour or anything else that may make them distasteful.

24. When the patient takes the purge, he should immediately be given a quantity of gruel not noticeably less than that to which he is accustomed. It is however customary to give no gruel during the purging. When purging stops, then less gruel than usual should be given, the amount subsequently being increased so long as the pain remains alleviated and no other contrary indication appears.

25. If it is proposed to give only barley-water, my advice is the same. I believe it to be better to start giving gruel right

away than to empty the body and then start a diet of gruel on the third, fourth, fifth, sixth or seventh day, unless the disease has already reached a crisis within that period. In this case too the same preparations should be made as have been described.

26. Such then is my opinion about the administration of gruel. As regards the sort of drink a patient should take, the gist of what I am going to say is very much the same. I know that physicians do the exact opposite of what is correct; they all want to dry up their patients for two or three days or more at the beginning of their illness, and then start to administer gruel and fluids. Perhaps it seems reasonable to them that when a violent change takes place in the body, it should be countered by a change equally violent.

27. A change in regimen may have considerable beneficial effects, but the change must be made in the right way and with intention. It is also important that the diet administered after the change should be correct. Those on a diet of thick gruel would suffer most if the change were incorrectly made, but those who are receiving only drink and those who take only barley-water would also suffer, the latter least.

28. Lessons should be drawn from our experience of what diets are best for men in health. If sudden changes in various diets are found to make a great difference to healthy people, it is only to be expected that they will have a great effect in disease, and the greatest in the acute diseases. It is well known that a low diet of food and drink is on the whole a surer way to health than violent changes from one diet to another. Sudden changes will harm those who take two meals a day and those who take one, and make them ill. Likewise, people who have not made a habit of taking luncheon are at once made ill if they take it. Their body feels heavy and they are weak and sluggish. If on top of this they dine they get heartburn. In some cases, too, loose stools are passed because the belly has been subjected to an unaccustomed load having been used to drying up and not being twice filled and having twice to digest a meal.

29. It is helpful in such cases to compensate for the change. An unwanted luncheon should be followed by a sleep, just as

we go to bed for the night after dinner. In winter, care should be taken to avoid shivering; in summer to avoid being too warm. If sleep will not come, a slow prolonged stroll, with no stops, should be taken. Dinner should be dispensed with, or only a little taken of something which can do no harm. Still less should be drunk and nothing watery. Such a man would suffer still more if he were to eat to repletion three times a day; still more if he did so more often. There are, however, many people who take three good meals a day without any ill effects, if they are accustomed to it.

30. It is also true that those who have been accustomed to eating two meals a day become weak, ill, slack at all kinds of work and suffer from heartburn, if they miss luncheon. Their intestines feel unsupported, they pass warm pale green urine and their stools are dried up. Sometimes, in addition, the mouth becomes bitter, the eyes sunken, the temples throb and the extremities become cold. As a rule those who have had no luncheon are unable to eat any dinner, or if they do their bellies feel heavy and they sleep less soundly than if they had previously taken luncheon.

31. Seeing that such things can happen to healthy people as the result of half a day's change in diet, it seems best in sickness not to give more nor less than the patient is accustomed to.

32. If a man, who contrary to his usual habit took only one meal, were to fast all day and eat his usual dinner, it is probable that it would lie still more heavily on him, seeing that he felt ill through missing luncheon and found his dinner lie heavy on him. The longer the fast which was suddenly broken, the more he would suffer.

33. An unaccustomed fast may be compensated for as follows. Excessive cold, heat or fatigue should be avoided, for all these would occasion distress. Less dinner should be taken than is usual and this should consist of the moist rather than dry foods. Drink should not be watery, and should not be less than usual in proportion to what is eaten. The next day a light luncheon should be taken and then a gradual return made to a normal diet.

34. People suffer most from these changes in diet when they

are of bilious disposition. Those who are phlegmatic generally suffer least discomfort from fasting, and so suffer less from taking only one meal a day contrary to their normal habits.

35. This will be sufficient to demonstrate that the most violent changes affecting our natures and constitutions are the most productive of illness. One must not without good reason order severe fasting, nor give food when a disease is at its height and is accompanied by inflammation, nor must one make sudden changes in either direction.

36. Many other related points concerning the belly could be mentioned, to show how well it puts up with food and drink to which it is accustomed, even if this is not naturally good. On the contrary, it has difficulty in digesting food and drink to which it is unaccustomed even if they are not bad in themselves.

37a. It would scarcely appear remarkable if pain in the stomach were caused by taking an excess of meat, or by garlic or silphium, either the juice or the stalk, or anything of the kind which has an individually potent effect. But it is surprising to learn how much distress, trouble, wind and colic in the stomach is caused by eating barley-cakes when one is accustomed to bread; or how much heaviness and constipation bread can cause one accustomed to barley-cakes. It is surprising, too, what thirst and sudden fullness is caused merely by eating bread when it is still warm, owing to its drying nature and the slowness with which it passes. Similarly, differing effects are produced by bread which is over-milled or made of unsifted meal if eaten by one not accustomed to it, or barley-cakes that are too dry or too moist or too sticky. Again, new barley-meal may affect those not accustomed to it, or that which is old, those accustomed to new.

Similarly, a sudden change in habit in which wine is substituted for water as a beverage, or vice versa, or the substitution of watered for neat wine: one produces distension of the upper part of the belly and wind in the lower, the other causes throbbing of the veins, heaviness in the head and thirst. Again, a change from white to red wine, even though both are equally strong, can cause an upset. All these things can cause many

disturbances in the body. It would therefore appear less remarkable that a sudden change from a sweet to a strong wine, or vice versa, should fail to preserve a balanced constitution.

37b. I must however make a small concession here to the opposite school of thought. Such conditions are corrected by reversing the regimen, because changes of diet in these cases are not accompanied by changes in the body. The body is not growing stronger so as to need more food, nor weaker so as to need less.

38. The severity and character of each disease must be considered in relation to the patient and his customary diet both solid and liquid. Any increase is specially to be avoided since it is often advantageous to prescribe a total fast in those cases where the patient appears likely to be able to survive until the disease reaches its height. The cases in which this should be done will be described.

39. Much that is akin to what has been said might be added, but the following is the most convincing evidence. Not only is it related to the subject that forms my main topic, but it is itself a most opportune lesson. Those who are stricken with an acute disease sometimes eat food the very same day as the disease begins, some eat on the next day. Some swallow whatever is to hand, and some even drink *cyceōn*.^{*} All these possibilities are more harmful than if some other diet had been followed. However, mistakes are much less serious at this stage than they would be if the patient fasted totally for two or three days and then started eating on the fourth or fifth day. It would be still worse if he should fast on these days and then subsequently start to take these things before the disease had passed its height, for it is quite obvious that such a course is generally fatal unless the disease be extremely mild. But mistakes at the beginning are not so serious and are much easier to remedy. This is, I think, a most important lesson: during the first days of an illness the patient must not be forbidden any kind of gruel if gruel or solid food is shortly afterwards to be prescribed.

40. There is in fact utter ignorance among those who take

*A mixture of wine, cheese and barley.

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barley-gruel that it is harmful if they have fasted for two or three days previously, and those who take barley-water are unaware that it too may do them harm unless they start taking it in the right way. It is however known, and the point is carefully observed, that it is very bad for the patient to drink barley-gruel before the disease has reached its height if he has been accustomed to barley-water.

41. All these things constitute clear evidence that physicians mishandle their patients' diets. They prescribe fasting in those diseases in which patients are going to be given gruel and who should not be prepared by fasting. They prescribe a change from fasting to gruel in just those cases in which a change should not be made. For the most part they prescribe the change from fasting to gruel at exactly the stage when it is beneficial to reduce the diet even to a complete fast, that is, when the disease is approaching a paroxysm.

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43.* I observe also that physicians are not acquainted with the way in which one can distinguish the various causes of weakness during the course of an illness: which is due to fasting, which to some other provocation, which to distress and to the violence of the disease; nor can they distinguish the various states and appearances engendered by the constitution and condition of each one of us. Yet life or death may hang upon the ability to distinguish and to recognize such things.

44. It is in fact a serious fault to give a patient who is weak from distress and the violence of the disease more drink or gruel or solid food under the impression that his weakness is due to fasting. It is also an outrage to fail to realize that a patient's weakness is due to fasting and to make him worse by prescribing abstinence. Not only is this latter mistake dangerous, though less so than the former, but it is more likely to involve the physician in ridicule. For another physician or even a layman has only to come along and, having recognized what has happened to the patient, give him something to eat

*Section 42, which is clearly an interpolation from another work, is omitted.

and drink in defiance of the other's orders, and the error is plain to all to see. Such are particularly the occasions which expose the practitioner to ridicule since the physician or layman who intervenes seems almost to have raised a man from the dead. The signs by which each condition can be distinguished will therefore be described.

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45.* This however is very similar to conditions in the belly. For if the whole body is rested much more than is usual, there is no immediate increase in strength. In fact, should a long period of inactivity be followed by a sudden return to exercise, there will be an obvious deterioration. The same is true of each separate part of the body. The feet and limbs would suffer in the same way if they were unaccustomed to exercise, or were exercised suddenly after a period of rest. The same is true of the teeth and of the eyes, and in fact of every part of the body. A softer bed than usual or one harder than usual causes distress, and sleeping in the open hardens the body.

46. A single illustration of all this will suffice. Suppose a man has a wound on the lower part of the leg which is neither very serious nor quite trifling, and not the sort which will heal very rapidly or very slowly. If from the first day he has it attended to and takes to his bed and never raises his leg, inflammation is less likely and he will be cured much more quickly than if he should walk about during treatment. If however on the fifth or sixth days, or even later, he should get up and walk about, he will suffer more distress than if he had been walking about from the beginning of the cure. And if at this stage he suddenly exerted himself much, he would suffer much more than if he had followed the other course of treatment and exerted himself to the same extent. All these facts hang together and constitute a proof that any change much in excess of what is moderate is harmful.

47. To take an immoderate amount of food after a long fast does very much more harm to the belly than to fast from a hearty diet, and may be compared with the effect on the other

* Something appears to be missing here.

parts of the body of over-exertion after a long period of rest. Just as the body should be given a complete rest and idleness, and slackness follow a long period of strenuous effort, so should the belly be given a rest from full feeding as otherwise it will cause pain and distress throughout the body.

48. Most of what I have said relates to changes from one diet to another. This is generally useful information, but something in particular must be added about the change from fasting to the taking of gruel in acute illnesses and this change must be made according to the instructions I give. Moreover, gruel must not be given until the disease has ripened or some sign has appeared either in the intestines, indicating starvation or irritation, or in the hypochondrium. These signs I shall describe.

49. Severe insomnia makes food and drink harder to digest. On the other hand, a change in the other direction relaxes the body and brings languor and headache.

50. The various effects in acute illnesses of the different sorts of wine, sweet or strong, white or red, and of hydromel, water or oxymel, can be judged from the following indications.

Sweet wine is less likely to produce headache than is heavy wine, it has less effect upon the mind and, as regards the internal organs, it is more easily passed than the other but causes enlargement of the spleen and liver. It is most unsuitable for those with bitter bile for it makes them thirsty. It may cause wind in the upper part of the intestine, but it does not trouble the lower part in this way. Wind caused by sweet wine does not easily escape but lingers about the hypochondrium. It is also, generally speaking, less easy to pass in the urine than is strong white wine. Sweet wine produces more sputum than the other kind. If one finds that drinking sweet wine causes thirst, it does not produce so much sputum as the other kind of wine; if it does not cause thirst, the opposite is true.

51. The main points in favour of and against white strong wine have already been pointed out in the description of sweet wine. As it passes more easily to the bladder than the other kind and is diuretic and purgative, it is always very beneficial in acute diseases. For even though it is less suitable than the

sweet in other respects, yet the cleansing through the bladder which it causes is beneficial so long as it is administered correctly. These are good points to note about the beneficial and the harmful properties of wine; they were unknown to my predecessors.

52. Tawny wine and bitter red wine should be employed in these diseases in this way. If there is neither headache nor affection of the mind, if there is no retention of sputum or urine, and if the stools are rather too loose and full of shreds, it is desirable to change from white or such wines to these. It should also be understood that the more it is diluted, the less harm it will do to the upper organs and to the bladder, while the less it is diluted, the greater is the benefit to the intestines.

53. To drink a mixture of honey and water throughout an illness caused by an acute disease is generally less suitable for those with bitter bile and enlarged viscera than it is for those who have not these things. It is less productive of thirst than is sweet wine and it softens the lung allowing sputum to be brought up in moderation and soothes a cough. It has some detergative quality which makes the sputum less tenacious than it would otherwise be. Hydromel is also a fair diuretic provided that none of the viscera interfere with this action. It also causes the passage of bilious stools, sometimes good ones, but sometimes they are excessive and more frothy than they should be. This is more likely to occur in those who are bilious or have enlargement of the viscera.

54. Softening of the lungs and expectoration of sputum is produced by a greater dilution of honey; frothy stools as well as those which are excessive and warmer than they should be, are due to a less diluted mixture. Stools of this kind bring other considerable troubles. Thus, instead of burning feelings in the hypochondrium being allayed they are provoked and cause distress, tossing of the limbs and ulceration of the internal organs or of the anus. Measures to prevent these things happening will be described.

55. The administration of honey and water without any gruel, instead of any other drink, is more often successful than not in these diseases. Of the reasons why in some cases it

should be given and in some not, the chief points have been stated.

56. Honey and water is generally acknowledged to enfeeble those who drink it and, for this reason, it has acquired a reputation for hastening death. It got this name from people starving to death, as some actually use this mixture for such a purpose. In fact it does not hasten death in all cases but is much more strengthening than water alone so long as it does not upset the stomach. Compared with white wine or with weak or odourless wine, it is in some ways more strengthening and in others more weakening. There is a vast difference in the effect on a patient's strength of wine and honey when taken undiluted. If a man were to eat a certain quantity of honey and another were to drink twice as much neat wine, the man who had eaten honey would gain much more strength so long as his stomach were not upset, for the wine causes the passage of much larger stools. If a man were to take gruel and then drink honey and water on top of it, the mixture would be too filling and would cause wind, besides being bad for the organs in the hypochondrium. However, it is not so harmful when drunk before gruel and may even be of some benefit.

57. Boiled hydromel is much more attractive in appearance than is the raw preparation, as it is then sparkling, thin, colourless and transparent. But I cannot attribute to it any other virtue that the raw drink does not possess. It is not even any sweeter than when taken raw, so long as the honey is good. It is, however, weaker and less productive of stools, neither of which are virtues in the case of honey and water. It is best used boiled when the honey is bad, not properly cleared, dark and of ill odour. Cooking will remove the worst of these faults.

58. You will also find the drink known as oxymel useful in these diseases as it promotes the bringing up of sputum and good respiration. The following are some useful points about it. If very sharp, its effect on tenacious sputum will be extreme. If it results in the bringing up of whatever is causing hoarseness and making the throat slippery and, as it were, sweeps the windpipe clean, then it will soothe the lungs owing to its

softening properties. Should all these things happen it is very beneficial. But sometimes for all its sharpness, oxymel fails to win the struggle to bring up the sputum but increases its viscosity and does harm. This is specially liable to happen in those who are in other respects likely to die and are unable to cough and fetch up the matter within. The patient's strength should be estimated with this in mind and, if there is hope, give it. If you do administer oxymel, give it just lukewarm, a little at a time and not in large quantities.

59. On the other hand, oxymel that is only slightly sharp moistens the mouth and pharynx, brings up the sputum and quenches thirst. It is good for the hypochondrium and for the neighbouring viscera. It also neutralizes the harmful effect of honey by correcting its bilious quality. It also breaks up wind and stimulates the passing of urine. However, it causes flabbiness in the lower part of the bowel and the passage of shreds. There are occasions when it is bad for those suffering from acute illnesses especially in that it prevents wind from passing through but makes it come back. It may also enfeeble the patient and chill his limbs. This is the only harm worth mentioning that oxymel can cause, so far as I know.

60. It is advisable to take a little of this drink of oxymel at night and on an empty stomach before taking gruel, though there is nothing to prevent its being taken a good while after the gruel is taken. Those who are subsisting on a completely fluid diet with no gruel will not find it suitable for continued use. This is chiefly because of the scraping and roughening which it produces in the intestines, and if the patient passes no stools it is likely to cause these things while the patient is taking nothing. Then, too, the honey and water might lose some of its strength. Should however the disease as a whole seem to benefit by the copious use of this draught, add only a suspicion of vinegar to the honey. This will avoid the most likely ill-effects and benefit the parts which need it.

61. To sum up, the sharpness obtained from vinegar is more beneficial to those with bitter bile than those with black bile because it dissolves bitter substances, turns them into phlegm and fetches them up. Black bile is lightened, brought up and

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diluted, for vinegar brings up black bile. Vinegar is generally more harmful to women than to men as it may cause pains in the womb.

62. There is no virtue which I can attribute to the drinking of water in acute disease. It neither soothes a cough in pneumonia, nor does it promote the expectoration of sputum so well as other drinks, if taken throughout the illness. However, if a little water is taken when changing over from oxymel to hydromel, it brings up the sputum on account of the change in the quality of the drinks by causing a sort of flood. Otherwise it does not even quench thirst but rather causes bitterness because it is of bilious nature, and is thus bad for those of bilious constitution and for the hypochondrium. The worst time to drink it is on an empty stomach for it is then most bilious in its effect and weakening. Water also causes enlargement of the spleen and liver when these are inflamed and it distends the stomach causing indigestion. It passes through slowly because it is both cold and crude and promotes neither the passage of stools nor of urine. This naturally constipating effect may prove harmful. If ever drunk when the feet are cold, it does very great harm to any organ that it attacks.

63. If there is any suspicion of a violent headache or derangement of the mind in these diseases, wine must be completely avoided. In such a case water should be given or, if wine is taken, it should be well watered down and tawny and quite devoid of smell. After such a draught, a small quantity of water should be taken. This prevents the strength of the wine going to the head and affecting the mind. Instructions as to when water alone should be drunk, when in large quantities and when more moderately, when warm and when cold, have already been given in part. The remainder will be mentioned in the appropriate places.

64. Similarly, instructions will be given in dealing with each disease regarding the other drinks that may be taken. The correct indications will be given for giving drinks made from barley, herbs, raisins or the second pressing of grapes, from wheat, thistle or myrtle, pomegranates and the rest. The same applies to compounded drugs.

65. Bathing is beneficial to most patients, to some if used continuously, to others if intermittently. Sometimes it must be used less than one otherwise would owing to the patient's lack of adequate facilities. There are not many houses where the necessary equipment and servants of the right kind are available. A bath can do no little harm if it is not taken in the right way. A sheltered spot free from smoke is needed, and plenty of water. Baths should be frequent but not excessively so unless there is some special reason. It is better not to be rubbed with soap, but if soap-mixture be used it should be warm and added to the water in far larger quantities than is usually the case and a further generous quantity should be added later and more soon afterwards. The patient should not have far to go to the bath-tub and it should be easy to get in and out of it. The bather should be quiet and orderly and should do nothing for himself; others should pour the water and rub him. A large quantity of tepid water should be prepared and it should quickly be poured over the bather. Sponges are better than scrapers and the body should not be allowed to get too dry before it is anointed. The head however should be dried as well as possible by wiping it with a sponge. Do not allow the extremities, the head and the rest of the body, to become chilled. Do not bathe shortly after food or drink, and do not eat or drink shortly after a bath.

66. The decision whether to bathe or not should rest largely with the patient if he is particularly fond of his bath and accustomed to it. Such people are more eager for it and derive benefit from bathing and suffer harm from abstaining. Generally speaking, it is most suitable for the treatment of cases of pneumonia and of *causus*, for bathing soothes pain in the side and chest and in the broad part of the back. It also causes the sputum to ripen and aids its expectoration; it promotes good respiration and relieves fatigue. It also relaxes the joints and softens the skin; it promotes the secretion of urine, cures headache and makes the nose moist.

67. Such then are the beneficial effects of bathing, if all necessities are available. Should however one or more of the necessary accompaniments be lacking, there is a risk that the

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bath will do more harm than good, for any one thing can cause considerable harm if it is not previously prepared by the attendants as it should be.

Bathing is least opportune for those suffering from diseases in which the bowels are more relaxed than they should be, nor should patients bathe who are too constipated and have not had any evacuation first.

Baths are also bad for those who are weak, those suffering from nausea or from vomiting, those who are bringing up bilious matter and those who have epistaxis unless this is trivial; you know what is opportune. If the indications are slight, a bath should be taken whether it benefits the whole body or only the head.

68. If then the preparations are satisfactory and the patient welcomes the idea, a bath should be taken every day. It will do no harm to those who are fond of bathing if they take one twice a day. Bathing is much more suitable for those who are on a diet of whole gruel and not just barley-water, though there are times when the latter too may bathe. Least of all should those who take only fluids bathe, though here again it may be allowed in some cases.

A decision must be based on what has been said about the type of patients who will derive benefit or not, according to their regimen. Those who need any of the beneficial effects of bathing should bathe in so far as it benefits them; but in those cases where there is no need of these effects, and any of the signs which render bathing harmful is present, baths should be avoided.

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The anthology of medical truths which has been famous enough to add a word to the English language.

Section I

1. Life is short, science is long; opportunity is elusive, experiment is dangerous, judgement is difficult. It is not enough for the physician to do what is necessary, but the patient and the attendants must do their part as well, and circumstances must be favourable.

2. In disturbances of the stomach and when there is spontaneous vomiting, it is beneficial to the patient if the noxious matter be voided. If it is not, then the reverse is the case. Similarly with fasting; if the desired effect be obtained there is benefit, but otherwise it is harmful. Accordingly, the place and season, the age of the patient and the nature of the disease must all be considered.

3. In the case of athletes too good a condition of health is treacherous if it be an extreme state; for it cannot quietly stay as it is, and therefore, since it cannot change for the better, can only change for the worse. For this reason it is well to lose no time in putting an end to such a good condition of health, so that the body can start again to reconstitute itself. Do not allow the body to attain extreme thinness for that too is treacherous, but bring it only to a condition which will naturally continue unchanged, whatever that may be. Likewise fasting, if taken to extremes, is treacherous; and so also is putting on weight, if excessive.

4. A light and frugal dietary is dangerous in chronic complaints and in those acute diseases where it is not indicated. Dieting which causes excessive loss of weight, as well as the feeding up of the emaciated, is beset with difficulties.

5. Sick people are in error when they take a light diet which only increases their distress. Then, whatever be wrong, they

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only become more ill on a light diet than they would on a slightly more substantial one. For this reason, light and frugal diets, when persisted in, are dangerous even for the healthy, because the undernourished do not bear an illness so well as the well nourished. Therefore, on the whole, light and frugal diets are more dangerous than those which are a little more substantial.

6. Desperate cases need the most desperate remedies.
7. During the specially acute phase of a disease, pain is most severe and the lightest possible diet is advisable. At other times, when a more substantial diet is permitted, it should be increased slowly in proportion as the seriousness of the disease decreases.
8. When the disease is at its height, then the lightest diet must be employed.
9. It must also be considered whether the patient will be strong enough for the diet prescribed when the disease is at its height. Will the patient be exhausted first and not be strong enough for the diet, or will the disease be blunted and exhausted first?
10. A light diet must be employed from the first in those diseases which rapidly approach their height. But when a disease only gradually attains its maximum severity, the diet need be reduced only then and for a little time before. Previously a richer diet may be employed depending upon the strength of the patient.
11. During a paroxysm the diet must be reduced, for an increase then would be harmful. Thus, in those diseases in which paroxysms occur at intervals, the diet must be reduced at each recrudescence.
12. Paroxysms and periods of remission may be foretold by the nature of the disease. Thus, the season of the year and the periodicity of the paroxysms, whether they be quotidian or tertian or at longer intervals, serve as indications. The signs which appear also assist. For instance, if sputum appear in a case of pleurisy early in the disease, it signifies that the illness will be a short one; if late, that the illness will be prolonged. The appearance of the urine, stools and sweat will also give

some indication of the expected duration and seriousness of a malady.

13. Old people bear fasting most easily, then adults, much less youths and least of all children. The more active they are, the less do they bear it.

14. Things which are growing have the greatest natural warmth and, accordingly, need most nourishment. Failing this, the body becomes exhausted. Old men have little warmth and they need little food which produces warmth; too much only extinguishes the warmth they have. For this reason, fevers are not so acute in old people for then the body is cold.

15. In winter and spring, stomachs are warm and sleep longest. Accordingly, more food should be given in these seasons, for the body produces more warmth and thus needs more nourishment. Young men and athletes show the truth of this.

16. Fluid diets are beneficial to all who suffer from fevers, but this is specially true in the case of children and those who are accustomed to such kind of food.

17. In deciding whether food should be given once or twice a day, more often or less, in greater or in smaller quantities at a time, one must consider habit, age, place and season.

18. Starchy food is most difficult to digest in summer and autumn, easiest in winter and next easiest in spring.

19. In those maladies where paroxysms occur at intervals, give no food just before the paroxysm nor compel the patient to take anything, but reduce his usual diet.

20. When a disease has attained the crisis, or when a crisis has just passed, do not disturb the patient with innovation in treatment either by the administration of drugs or by giving stimulants. Let them be.

21. The progress of a disease should be so guided, where guidance is needed, so that it develops in the most favourable manner according to its natural tendency.

22. Use drugs only when the disease for which you employ them has come to a head and not when it is developing, unless it be ripe for such treatment, which is rarely the case.

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23. Do not judge the stools by their quantity but by their quality and the manner of them, what is needful and comfortable for the patient. Where it is necessary to bring the patient to a fainting condition, even this should be done, if he be strong enough to stand it.

24. In acute diseases employ drugs very seldom and only at the beginning. Even then, never prescribe them until you have made a thorough examination of the patient.

25. If what ought to be voided is voided, it is beneficial and easily borne by the patient; if not, it is borne with difficulty.

Section II

1. A disease in which sleep causes trouble is fatal. Where sleep is beneficial, it is not fatal.

2. Sleep that stops delirium is good.

3. Both sleep and wakefulness are bad if they exceed their due proportion.

4. Neither a surfeit of food nor of fasting is good, nor anything else which exceeds the measure of nature.

5. Unprovoked fatigue means disease.

6. Those who are suffering from a bodily malady and do not feel much of the pain of it, are also suffering from mental disease.

7. When bodies become thin over a long period of time, feed them up again slowly. But when the wasting has come on in a short time, feed them up again quickly.

8. If, subsequent to an illness, a patient does not derive strength from the nourishment he takes, it means he requires more food. But if this happens when adequate nourishment is taken, it means a purge is necessary.

9. When it is desired to purge, the aim should be an easy evacuation.

10. The more nourishment you give to a person who has not been purged, the more harm you do.

11. It is better to be full of drink than full of food.

12. What is left behind in the body after the crisis frequently causes relapse.

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13. A patient finds the night before a crisis trying, but the succeeding night is generally more comfortable.

14. In the case of haemorrhage from the stomach, a change in the character of the stool, if not clearly unfavourable, may indicate a change for the better.

15. Examine the stool in the case of patients suffering from diseases of the throat or from tumours of the body. If it be bilious, the disease is part of a sickness of the whole body. But if it resembles a normal stool, then the disease is localized and it is safe to feed the body.

16. Hard work is undesirable for the underfed.

17. Over-eating causes sickness, as the cure shows.

18. Those who eat their food quickly in large pieces, quickly void it.

19. It is unwise to prophesy either death or recovery in acute diseases.

20. Those who have relaxed bowels when they are young have constipated ones in later life; but if their bowels are constipated in youth they become relaxed as they grow old.

21. Hunger is alleviated by the drinking of neat wine.

22. Disease which results from over-eating is cured by fasting; disease following fasting, by a surfeit. So with other things; cures may be effected by opposites.

23. Acute diseases attain the crisis within fourteen days.

24. In the progress of a disease, it is the fourth day in each period of seven days which is indicative. Taking the eighth day of the disease as the beginning of the second period of seven days, it is the eleventh day which must be observed since that is the fourth day of the second period. Again the seventeenth day must be watched since this is the fourth day after the fourteenth or the seventh after the eleventh.

25. In summer, quartan fevers are usually of short duration; in autumn they last long, especially those contracted when winter is near.

26. It is better that a fever should succeed a convulsion than a convulsion follow a fever.

27. Too much hope must not be put in the regression of a disease when this happens without obvious cause, neither

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should deterioration occurring contrary to expectation be feared overmuch. Such changes are of uncertain significance and usually last but a short time.

28. In feverish illnesses it is bad either if the body remains superficially the same and does not waste, or if it wastes more than might be expected. In the former case the malady will belong; in the latter there is evidence of the patient weakening.

29. Purge at the start of an illness if you think fit, but, when a disease is at its height, it is better to withhold such action.

30. Everything is at its weakest at the beginning and at the end, but strongest at its height.

31. It is a bad thing if a patient does not put on weight when he is being fed up after an illness.

32. As a general rule, if those who are poorly take their food well at first, but fail to put on weight, they finish by refusing food. On the other hand, if they firmly refuse food at first but take it later on, they make a good recovery.

33. In every illness, a healthy frame of mind and an eager application to victuals is good. The reverse is bad.

34. There is less danger from a disease which is proper to the nature, condition and age of a patient, or to the time of year, than if it be not proper to one of these.

35. In all maladies, those who are fat about the belly do best; it is bad to be very thin and wasted there. Purging may be dangerous in the latter case.

36. Those who are in unhealthy bodily condition are very liable to faint from the administration of purgative drugs, as do those who do not take the right food.

37. Those who are in good bodily condition are hard to purge.

38. With regard to food and drink, it is better to take something slightly less suitable but pleasing than something more suitable but less pleasing.

39. The old feel ill less often than the young, but when they contract chronic ailments these usually accompany them to the grave.

40. Hoarseness and running of the nose do not 'ripen' in the very old.

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41. Those who are subject to frequent and severe fainting attacks without obvious cause die suddenly.
42. It is impossible to cure a severe attack of apoplexy and no easy matter to cure a mild one.
43. Those who have been strangled and who are unconscious but not yet dead will not recover if there is foam about the lips.
44. Sudden death is more common in those who are naturally fat than in the lean.
45. The chief factor in the cure of epilepsy in the young is change, especially that due to growing up, but seasonal change of climate, or change of place or mode of life are also important.
46. If a patient be subject to two pains arising in different parts of the body simultaneously, the stronger blunts the other.
47. Pain and fever are more marked while pus is forming than when it is formed.
48. Rest, as soon as there is pain, is a great restorative in all disturbances of the body.
49. Those who are used to bearing an accustomed pain, even if they be weak and old, bear it more easily than the young and strong who are unaccustomed.
50. What has become customary by long endurance is wont to give less annoyance than what is not customary, even if the former be more severe. But it may sometimes be necessary to produce a change to what is unaccustomed.
51. It is dangerous to disturb the body violently whether it be by starvation or by feeding, by making it hot or cold, or in any way whatsoever. All excesses are inimical to nature. It is safer to proceed a little at a time, especially when changing from one regimen to another.
52. If you apply all the regular treatment without getting the regular result, do not therefore change the treatment so long as your original diagnosis remains unchanged.
53. Those who have relaxed bowels, if they are young, tend to do better than those with constipated ones, but worse if they are getting old; for it is a general rule that the bowels become constipated with advancing years.

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54. A heavy physique is noble and not unpleasing in the young; in old age it is awkward and less desirable than a smaller stature.

Section III

1. The changes of the seasons are especially liable to beget diseases, as are great changes from heat to cold, or cold to heat in any season. Other changes in the weather have similarly severe effects.

2. Some natures are naturally well-suited to summer and some to winter; others are ill-suited to one or the other.

3. Diseases vary in their relationships one with another; some are opposed, some are mutually agreeable. Similarly, certain ages are well- or ill-suited to certain seasons, places and regimens.

4. When cold and heat both occur on the same day at any time of the year, then you must expect those diseases commonly encountered in autumn.

5. South winds cause deafness, misty vision, headache, sluggishness and a relaxed condition of the body. When this wind is prevalent these symptoms occur in illnesses. The north wind brings coughs, sore throats, constipation, retention of urine accompanied by rigors, pains in the sides and breast. When this wind is prevalent such things will be encountered among the sick.

6. When the summer is spring-like in character, then expect much sweating in the course of fevers.

7. During periods of drought fevers are high. If the whole year be mainly dry, whatever the general climatic condition produced, expect similar illnesses.

8. When the weather is seasonable and the crops ripen at the regular times, diseases are regular in their appearance and easily reach their crisis. When the weather is irregular, diseases are irregular and their crises difficult.

9. It is in autumn that diseases tend to be most acute and most likely to prove fatal. The spring is the healthiest and least fatal time of year.

10. Autumn is worst for consumptives.

11. As regards the seasons: a dry winter with northerly winds followed by a wet spring and southerly winds produces acute fevers, ophthalmia and dysentery in the summer. This is specially true of women and those of a watery constitution.

12. On the other hand, a damp mild winter accompanied by southerly winds, followed by a dry spring in which the wind is from the north, tends to produce miscarriage on the slightest pretext in women approaching term in the spring. If parturition is accomplished the children are weak and sickly, so that either the children die at once or, should they survive, they are thin and fall ill frequently. This same character of the seasons gives rise to dysentery and dry ophthalmia as well, while the aged suffer from catarrh which may speedily prove fatal.

13. A dry summer accompanied by northerly winds and a wet autumn with southerly winds produce during the following winter headaches, coughs, hoarseness, running at the nose and, in some cases, wasting.

14. Alternatively, a rainless autumn in which the winds come from the north is advantageous to women and those of a watery constitution. Others suffer from dry ophthalmia, from acute fevers, from running at the nose and, in some cases, from melancholy.

15. As regards the weather in general: drought is more healthy than rain and less likely to provoke fatal illness.

16. The diseases usually peculiar to rainy periods are chronic fevers, diarrhoea, gangrene, epilepsy, apoplexy and sore throats. Those peculiar to a time of drought are consumption, ophthalmia, arthritis, strangury and dysentery.

17. As for the daily changes in the weather: a north wind stimulates the body and makes it of good tone and agile, and makes for a good complexion and acuity of hearing; the bowels are constipated and the eyes sting. But a pain in the chest is made worse by such a wind. On the other hand, south winds relax the body, make the tissues moist, reduce acuity of hearing and produce headaches and vertigo. Movement both of the eyes and of the body generally is sluggish and the bowels relaxed.

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18. As for the seasons, in spring and full summer children and young people do best; in summer and, up to a point, autumn, the old; while the winter suits best those between these two groups.

19. Every disease occurs at all seasons of the year but some of them more frequently occur and are of greater severity at certain times.

20. For example, madness, melancholy, epilepsy, haemorrhages, sore throats, catarrh, hoarseness, coughs, leprosy, vitiligo, ulcerative eruptions - these are very common - tumours and arthritis are all common in the spring.

21. In summer, while some of the foregoing occur, we must also expect continued fevers, *causus*, tertian fevers, vomiting, diarrhoea, ophthalmia, earache, ulcers in the mouth, gangrene of the genitalia and heat spots.

22. In autumn, while we still encounter many of the summer ailments, you must expect as well quartan fevers, irregular fevers, diseases of the spleen, dropsy, consumption, strangury, enteritis, dysentery, pains in the hips, sore throats, ileus, epilepsy, madness and melancholy.

23. During the winter season, pleurisy, pneumonia, lethargy, catarrh of the nose, hoarseness, cough, pain in the chest, pains in the side and loins, headache, vertigo and apoplexy all occur.

24. Then, if diseases be grouped according to different ages we find that new-born infants suffer from aphthae, vomiting, cough, insomnia, nightmares, inflammation of the umbilicus and discharging ears.

25. When teething takes place, we must add painful gums, fevers, convulsions and diarrhoea. These are specially to be expected during the eruption of the canines and in plump children or those with hard bellies.

26. As they grow older, tonsillitis, deflexions of the vertebrae of the neck, asthma, stone, infection with round worms and ascaris, pedunculated warts, priapism, scrofulous swellings in the cervical glands and other tumours are seen.

27. On approaching puberty, besides the foregoing diseases we must add long-continued fevers and epistaxis.

28. Usually children's diseases reach the crisis either in forty

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days, in seven lunar months or in seven years. Others resolve on the approach of puberty. However, should a disease persist after puberty or, in the case of girls, the time when menstruation is established, it is likely to become chronic.

29. In youths, haemoptysis, consumption, acute fevers and epilepsy besides other ailments must be added, but especially those mentioned above.

30. Later, we encounter asthma, pleurisy, pneumonia, lethargy, inflammation of the brain, *causus*, chronic diarrhoea, cholera, dysentery, enteritis and haemorrhoids.

31. In the old, dyspnoea, catarrhal coughs, strangury, dysuria, arthritis, nephritis, dizziness, apoplexy, cachexia, pruritus of the whole body, insomnia, ascites and fluid in the eyes and nostrils, failing sight, blindness from glaucoma and deafness.

Section IV

1. Drugs may be administered to pregnant women, if required, from the fourth to the seventh month of gestation. After that period, the dose should be less. Care must also be exercised in giving drugs to infants and children.

2. Drugs should be used to evacuate from the body such substances which, should they flow of their own accord, would be beneficial. Those substances, evacuation of which would not be advantageous, should be stopped from coming.

3. If those substances are purged which ought to be purged, it is beneficial and the patient bears it well; if the reverse, it is borne ill.

4. In summer-time, use drugs acting rather on the upper part of the bowel; in winter the lower part.

5. The administration of drugs is attended with difficulty at the rising of the Dog Star and shortly before.

6. Thin subjects who are prone to vomiting should be given medicine for the upper bowel, but reduce the dose in winter.

7. The well-covered, who are not prone to vomiting, should be given drugs for the lower bowel, but in this case avoid the summer.

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8. In purging consumptive patients, employ only small doses.
9. The bowel should be treated in melancholics by the same reasoning applying the opposite treatment.
10. In very acute conditions, administer the required drugs on the same day as they are shown to be required. It is bad for such conditions to last long.
11. Patients suffering from colicky pains about the navel and aching in the loins develop distension unless the malady is dispersed by drugs or by other means.
12. It is bad to administer drugs acting on the small bowel during the winter in patients prone to enteritis.
13. Patients in whom purgation of the upper bowel is attended with difficulty should have their bodies moistened beforehand by administering more food and giving more rest, before the prescription of hellebore.
14. When anyone takes a draught of hellebore, he should be made to move about rather than left to rest and sleep. Sea travel demonstrates the efficacy of movement in producing a disturbance of the intestines.
15. If you wish hellebore to act more efficiently, keep the patient moving. When you wish to stop its action, order rest and sleep.
16. Hellebore is a dangerous drug for those with healthy flesh since in these it induces convulsions.
17. A patient without fever and with no appetite who suffers from heartburn, vertigo and bitterness in the mouth requires medicine for the upper part of the body.
18. Pain above the diaphragm indicates the need for drugs acting on the upper part of the body; pain below, for those acting on the belly.
19. When a purge is given to a patient who is not thirsty, its action continues until he becomes thirsty.
20. If a patient without fever suffers from colic, heaviness of the legs and aching in the loins, he needs drugs for the lower organs.
21. Black excrement, like blood, appearing spontaneously has a serious significance whether it be accompanied by fever

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or not. The darker it is the more serious the condition. But when dark stools are due to drugs, however dark the colour, it is of little significance.

22. The vomiting or passage of dark bile at the beginning of an illness is fatal.

23. Those who show great wasting, either from acute or chronic illness or from wounds, and then pass dark bile or something resembling black blood, die the next day.

24. Dysentery starting with the passage of black bile is fatal.

25. The vomiting of blood of any kind is bad; its passage as excrement is not a good sign, nor is the passage of black stools.

26. Cases of dysentery in which pieces resembling solid tissue appear in the stools are fatal.

27. If a fever be attended with considerable haemorrhage from any part of the body, the patient's bowels become relaxed during recovery.

28. Biliaryness of the stool ceases upon the supervention of deafness, deafness upon the appearance of biliary excrement.

29. A rigor occurring on the sixth day of a fever is a sign of a dangerous crisis.

30. A paroxysm which appears at the same hour on one day as it departed on the previous day is a sign of a dangerous crisis.

31. Suppurative inflammations about the joints, especially about the jaws, may follow exhaustion from fevers.

32. During recovery from an illness, pain about a part indicates that suppuration will occur there.

33. But should pain in a part have existed before the onset of the disease, then that is the site where the malady establishes itself.

34. Sudden choking without swelling of the throat in a patient with fever leads to a fatal outcome.

35. If, in a patient suffering from a fever, the neck be suddenly twisted round and swallowing becomes almost impossible though there is no swelling, then he will die.

36. Paroxysms of sweating in the course of fevers occurring on the 3rd, 5th, 7th, 9th, 11th, 14th, 17th, 21st, 27th, 31st, and

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34th days of the disease are of good omen. Such paroxysms mark the crisis of the disease. But should such paroxysms not occur, then expect pain, a long illness and relapse.

37. In severe fevers, cold paroxysms of sweating indicate death; in milder cases a long illness.

38. The appearance of sweat on a particular part of the body indicates disease in that part.

39. Should one part of the body be hotter or colder than the rest, disease is present in that part.

40. Changes from hot to cold and then to hot again, affecting the whole body, or changes of colour signify a long illness.

41. Severe sweating after sleep without obvious cause signifies that the body has too much nourishment. If it happens that the patient is not taking his food, then he needs purging.

42. Continued sweating, whether hot or cold, indicates disease. If the sweat be cold, it is a major illness; if hot, a minor.

43. Continued fevers are dangerous if they grow worse every other day; should they however be remittent, in whatever fashion, it means that there is no danger.

44. Prolonged fevers may give rise to swelling and pains in the joints.

45. Those suffering from swelling and pain in the joints as a result of fever are taking too much food.

46. When a rigor supervenes on an unremitting fever when the patient has already been weakened, the outcome is fatal.

47. Livid, bloody, foul-smelling or bilious sputum supervening in cases of continued fever is of bad significance. However, if such expectoration remove the diseased matter, all may be well. A similar rule applies to the urine and to the stools. But unless separation occurs properly through these parts the outlook is poor.

48. Cold skin associated with a high internal temperature and thirst in a patient with continued fever is fatal.

49. In a continued fever, if the lip, eyebrow, eye or nostril be distorted; if the patient, being already weak, does not see or does not hear - if any of these things happen, death is at hand.

50. If, in a continued fever, respiration becomes difficult and delirium occurs, expect a fatal outcome.

51. Unless an abscess associated with fever discharge about the time of the first crises, a long illness is to be expected.

52. There is nothing strange in those suffering from fevers, or from other illness, deliberately weeping. But if they weep spontaneously, in spite of themselves, it is of more significance.

53. When, in fevers, the gums suppurate, the fever is increased.

54. In fevers of the type of *causus* where there is a frequent dry cough irritating slightly, thirst is not produced.

55. Fevers lasting more than one day which follow on a bubo are all serious.

56. A paroxysm of sweating in the course of a fever which is not associated with a fall in temperature is of bad significance. It indicates excess of moisture in the body and the illness will be prolonged.

57. Fever, succeeding a convulsion or tetanus, ends the illness.

58. An attack of shivering supervening in a case of *causus* puts an end to it.

59. A pure tertian fever reaches its crisis after a maximum of seven paroxysms.

60. When in the course of a fever, deafness, epistaxis or disorder of the stomach supervenes, the illness is approaching its end.

61. If the length of a fever is not an odd number of days, relapse is likely to occur.

62. If jaundice appears in a case of fever in less than seven days, the outlook is bad unless watery discharges from the belly occur.

63. In fevers attended with daily rigors, the fever intermits daily; it is not remittent.

64. Jaundice occurring on the 7th, 9th, 11th or 14th day of a fever is favourable unless the right hypochondrium be hard. In other cases, the outlook is unfavourable.

65. A sensation of burning in the belly and heartburn are of bad significance in fevers.

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66. In acute fevers convulsions or violent pains in the intestines are of bad significance.
67. In cases of fever, fear on waking from sleep, or convulsions, are serious.
68. Irregular breathing in cases of fever is bad since it indicates a fit.
69. When the urine of a man with fever is thick, full of clots and of small quantity, an increase in quantity and clarity is advantageous. Such a change is especially likely to occur if, from the beginning or very shortly afterwards, the urine has a sediment.
70. Those whose urine during a fever is turbid like that of a beast of burden either suffer from headache or will do so.
71. When the crisis of an illness is reached on the seventh day, the urine shows a red cloud on the fourth day and is otherwise normal.
72. Colourless urine is bad; it is specially common in those with disease of the brain.
73. If pain in the loins and fever supervene when the hypochondrium is distended and full of rumblings, the bowels become relaxed unless wind breaks or the patient passes a large quantity of urine.
74. When suppuration is suspected in a joint, the suppuration is avoided if the urine which flows is thick and white, like that which is seen sometimes in wearisome quartan fevers. If there is epistaxis as well, it very quickly stops.
75. Blood or pus in the urine indicates ulceration of the kidneys or of the bladder.
76. Small fleshy objects, the shape of hairs, in the urine which is thick, mean there is a discharge from the kidneys.
77. Thick urine containing bran-like particles indicates inflammation of the bladder.
78. The sudden appearance of blood in the urine indicates that a small renal vessel has burst.
79. A sandy urinary sediment shows that a stone is forming in the bladder.
80. When blood clots in the urine are accompanied by

strangury, abdominal and perineal pain, it is the parts about the bladder which are affected.

81. The presence of blood, pus and flakes in a foul-smelling urine indicates an ulcer of the bladder.

82. If a tumour form in the urethra, suppuration and discharge of the abscess produce resolution.

83. Much urine passed at night means a small stool.

Section V

1. Convulsions following the administration of hellebore are fatal.

2. Convulsions succeeding upon a wound are fatal.

3. When a convulsion or a fit of hiccoughs follows severe haemorrhage, the outlook is bad.

4. A convulsion or a fit of hiccoughs following excessive purging is bad.

5. If a drunk man suddenly becomes speechless in a fit, he will die after convulsions unless a fever ensue or unless, upon recovering from his hangover, he regains his voice.

6. Unless those who contract tetanus die within four days they recover.

7. Those who suffer from epilepsy in childhood recover from it, but when it first appears after the age of twenty-five it usually continues till death.

8. If sufferers from pleurisy do not cough up material within fourteen days, the inflammation produces empyema.

9. Consumption occurs most frequently between the ages of eighteen and thirty-five.

10. Those in whom, from a sore throat, the disease passes to the lungs, either die within seven days or, surviving this period, suffer from empyema.

11. If the sputum of those suffering from consumption have an unpleasant smell when poured on hot coals and if the hairs fall from the head, a fatal outcome results.

12. In consumption, loss of the hair of the head accompanied by diarrhoea is fatal.

13. Frothy blood comes from the lungs.

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14. Diarrhoea supervening on consumption is a fatal sign.
15. If those patients in whom pleurisy has resulted in empyema evacuate the abscess by expectoration within forty days following its bursting, they recover. If this is not so, they become consumptive.
16. Frequent over-heating of the body causes the following troubles: relaxation of the flesh, nervous weakness, numbing of the mind, haemorrhage, fainting attacks and in some cases death.
17. Cold causes fits, tetanus, gangrene and feverish shivering fits.
18. Cold is bad for the bones, teeth, nerves, brain and the spinal cord; heat is good for these structures.
19. Parts that have been chilled should be thoroughly warmed unless there is bleeding or the likelihood of this.
20. In patients already suffering from ulcers, cold is of severe effect. It hardens the flesh round about, causes pain without suppuration, gangrene, feverish rigors, spasms and tetanus.
21. In young, well nourished people, tetanus is sometimes seen which does not follow upon an ulcer. In these a cold douche in summer produces a reaction of warmth and this warmth effects a cure.
22. Warmth which produces suppuration, as it may do with some but not all ulcers, is an important sign of recovery. It softens the skin, dries it up and relieves pain. Further, rigors, spasms and tetanus are resolved. To the head, it relieves headaches. Warmth is also of value in the treatment of broken bones, especially when the bone is exposed. It is useful in the treatment of ulcers on the head. Those parts of the body where ulcers or gangrene have been caused by exposure to cold benefit much from warmth and a crisis is attained. Similar advantage from warmth is observed in cases of ulceration of the anus, the private parts, the womb and the bladder. Cold, in these diseases, is inimical and killing.
23. Cold should be applied in the following cases: when there is haemorrhage or the danger of one. In such cases apply the cold not to the actual spot from which bleeding occurs or

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is expected, but round about. Cold should also be applied to boils or pustules when these tend to be red or suffused with fresh blood. Cold turns pustules dark when they are long-standing. Cold applications are also indicated in cases of erysipelas where there is no ulceration; if ulcers have formed it is harmful.

24. Cold substances such as snow and ice are harmful to the chest; they cause cough, haemorrhage and fluxes.

25. Swelling and pain in the joints unassociated with ulceration, gout and spasms, are mostly relieved and reduced by cold douches and the pain thus dispelled. A moderate numbness relieves pain.

26. Water that is capable of quick heating and quick cooling is very light.

27. When a patient feels thirsty at night and has a great desire to drink and if afterwards he sleep, it is a good sign.

28. Aromatic vapour baths are useful in the treatment of female disorders and would often be useful for other conditions too if they did not cause headaches.

30.* Acute diseases are fatal to pregnant women.

31. Miscarriage follows blood-letting in pregnant women, especially if the foetus be large.

32. If a woman vomits blood, this ceases with the onset of menstruation.

33. It is a good sign if epistaxis occurs in a woman whose menstruation has stopped.

34. Frequent diarrhoea in a pregnant woman renders her liable to a miscarriage.

35. When a woman who is afflicted with hysteria, or who is in difficult labour, sneezes, it should be regarded as a good sign.

36. If the menses are not the proper colour and do not occur regularly, it is a sign that a purge is required.

37. If the breasts of a pregnant woman regress suddenly, it means she will have a miscarriage.

38. If, in a woman who is carrying twins, one breast becomes thin, a miscarriage will occur of one of the children.

*29 (=IV, 1) is here omitted.

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If the right breast is affected, the male child will be lost; if the left, the female.

39. If a woman who is neither pregnant nor has given birth produce milk, her menstruation has stopped.

40. It is a sign of madness when blood congeals about a woman's nipples.

41. To know whether a woman be pregnant, administer a draught of hydromel on retiring when she has had no supper. If she suffers from colic in the stomach she is pregnant; if not, she is not pregnant.

42. A pregnant woman is of good complexion if the child be male; of ill complexion if the child be female.

43. If a pregnant woman have erysipelas of the womb she will die.

44. Pregnant women who are abnormally delicate have a miscarriage before the foetus becomes sizeable.

45. When women of medium build have miscarriages at two or three months without obvious cause, it is because the placenta is full of mucus. It is thus unable to hold the weight of the foetus which therefore is ejected.

46. When abnormally fat women do not conceive, it is because the omentum is pressing on the mouth of the uterus. Until they become thin, they do not become pregnant.

47. If suppuration in the womb spreads to the region round the hip joint, lint pledges should be used to stop it.

48. A male foetus inclines to the right, a female to the left.

49. When a drug which causes sneezing is used to expel the after-birth, stop up the mouth and nostrils.

50. To restrain a woman's menstruation, apply the largest possible cupping-glass to the nipples.

51. During pregnancy the mouth of the womb is closed.

52. If much milk flows from the breasts of a pregnant woman it means that the foetus is weak; but if the breasts be dry, the foetus is healthy.

53. When abortion is threatened the breasts become lax. If the nipples should become hard again, there will be pain in the nipples or in the hip joints or in the eyes or in the knees and abortion will not take place.

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54. If the mouth of the womb is hard, it inevitably closes.
55. Pregnant women who catch fevers, or who become very emaciated without obvious cause, either have difficult and dangerous labours or run the risk of miscarriage.
56. A spasm or an attack of fainting following on menstruation is bad.
57. When menstruation is excessive or is suppressed, this indicates disease of the womb.
58. Inflammation of the rectum and of the womb produce strangury, as also do suppurative conditions of the kidneys. Inflammation of the liver, however, causes hiccough.
59. If a woman has not conceived and you wish to determine whether conception be possible, wrap her up in a cloak underneath which incense should be burned. If the odour seems to pass through the body to the nose and mouth, then she is not sterile.
60. Menstrual bleeding which occurs during pregnancy indicates an unhealthy foetus.
61. When in a woman who is suffering from neither rigors nor fever menstruation is suppressed and she suffers from nausea, she is pregnant.
62. Women in whom the cervical os is cold and thick tend not to conceive easily. Similarly, a very moist os drowns and destroys the semen while an unusually dry and hot condition destroys the seed from lack of nourishment. Women who are free from these extremes are those who conceive best.
63. It is much the same with males. Either the general laxness of the body is such that the inner pressure of the wind is insufficient to eject the semen, or, on account of the thickness of the tissues, adequate moisture does not pass through. Also, cold may prevent it from heating sufficiently to collect where it should; or the same may happen through excessive heat.
64. Milk is not recommended for those who suffer from headaches. It is bad, too, for patients with fever, those whose bellies are distended and full of rumbling and those who are thirsty. It is bad also for patients with acute fevers in whom the stools are bilious, and for those who have lost much blood

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in the stool. It is good for patients liable to consumption if they have not too high a fever. It should also be given in cases with prolonged low fever, where the patient is abnormally wasted, provided none of the above-mentioned contra-indications is present.

65. Those who suffer from wounds with swelling in addition are not particularly liable to spasms or madness. However, if the swellings suddenly disappear, spasms and tetanus occur where the lesions are situated posteriorly. If, however, the lesions are on the front of the body, madness, acute pain in the sides or suppuration follows. Where the swellings are particularly red, dysentery is seen.

66. If swelling does not occur as a result of serious deep wounds, the outlook is very bad.

67. Loose soft elastic swellings are not serious; hard indurated swellings are serious.

68. When there is pain at the back of the head, some help may be given by dividing the vessel which runs vertically in the forehead.

69. Rigors in women usually begin in the loins and pass through the back to the head. In men they tend to begin in the back rather than in the front of the body, for instance in the thighs or forearms. But men have a porous skin, as is shown by the hairs.

70. Those who catch quartan fevers are not at all liable to spasms. Should they previously have a spasm and then develop a quartan fever, then the spasms stop.

71. Those whose skin is dry and taut die without sweating. Those whose skin is relaxed and porous die sweating.

72. Jaundiced patients do not suffer especially from flatulence.

Section VI

1. In cases of chronic enteritis, the occurrence of heartburn, should it not have occurred before, is a good sign.

2. Those whose noses tend to run and whose semen is watery tend to be rather sickly. Those in whom the reverse is true are healthier.

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3. Loss of appetite is bad for long-standing cases of dysentery and particularly when the disease is accompanied by fever.
4. Ulcers with a peeling edge are malignant.
5. Care must be taken to determine whether there are any striking points about the site of any pains complained of; whether they are in the side, in the breast or anywhere else.
6. Diseases of the kidneys and of the bladder are difficult to cure in the aged.
7. Of those pains and swellings which occur in the belly, those which are on the surface are less serious than those which are not.
8. Ulcers on the body are difficult to heal in dropsical patients.
9. Widespread exanthems are not accompanied by much itching.
10. Severe headaches are cured should there be a flow of pus, blood or fluid from the nostrils, mouth or ears.
11. It is good when haemorrhoids supervene on cases of melancholy or where there is renal disease.
12. Where long-standing haemorrhoids have been cured there is danger of dropsy or of wasting supervening unless one be left untreated.
13. Sneezing supervening on an attack of hiccoughs relieves that condition.
14. When, in a case of dropsy, water flows from the blood vessels into the abdominal cavity, the condition is relieved.
15. Unprovoked vomiting puts an end to long-continued cases of diarrhoea.
16. Diarrhoea supervening in cases of pleurisy or pneumonia is a bad sign.
17. It is good when sufferers from ophthalmia have diarrhoea.
18. Deep wounds of the bladder, brain, heart, diaphragm, or of any of the delicate entrails, the stomach or liver are fatal.
19. Division of bone, cartilage, nerve, the delicate part of the jaw, or of the foreskin is not followed by growing and joining together again.

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20. Haemorrhage into the abdominal cavity is necessarily followed by suppuration.
21. Varicose veins or haemorrhoids appearing in a case of madness put an end to it.
22. Abscesses extending from the shoulders to the elbows are cured by bleeding.
23. Patients with fear or depression of long standing are subject to melancholia.
24. Division of the delicate entrails is not followed by repair.
25. When erysipelas, beginning on the surface, extends deeply into the body it is bad. However, deep inflammation coming to the surface is good.
26. Trembling in cases of *causus* is cured by delirium.
27. Should surgery or cauterization in patients with ulcers or with dropsy result in the loss of a great quantity of pus or watery fluid, death invariably follows.
28. Eunuchs are not subject to gout, nor do they become bald.
29. Gout does not occur in women except after the menopause.
30. A youth does not suffer from gout until after sexual intercourse.
31. Pains in the eyes are cured by drinking neat wine, by bathing, by vapour baths, by bleeding or by the administration of certain drugs.
32. People who lisp are especially liable to prolonged diarrhoea.
33. Those who suffer from heartburn are not particularly liable to pleurisy.
34. Those who are bald do not suffer from varicose veins, while should someone who is bald develop such veins, then his hair grows again.
35. It is bad when people with dropsy develop a cough, but good if they have the cough before the dropsy starts.
36. Dysuria is cured by bleeding and the incision should be in the inner vein.
37. In a case of sore throat, the development of swellings on the outer aspect of the trachea is a good sign.

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38. It is better not to treat those who have internal cancers since, if treated, they die quickly; but if not treated they last a long time.

39. Spasms are cured either by over-eating or by fasting. The same is true of hiccoughs.

40. Pain around the hypochondrium, unattended by inflammation, is relieved by the onset of fever.

41. The thickness of the tissues themselves may be responsible for the absence of the signs of suppuration when the abscess is a deep one.

42. In cases of jaundice it is a bad sign when the liver becomes hard.

43. Should a splenetic patient catch dysentery and this become chronic, dropsy or enteritis supervenes and he dies.

44. Those who suffer from anuria as a result of strangury die within seven days unless, a fever supervening, a sufficient flow of urine is re-established.

45. Ulcers lasting a year or longer cause the underlying bone to be eaten away and the resulting scars are depressed.

46. Those who develop a hump-back from asthma or from cough before reaching puberty, die.

47. In cases where such treatment is advantageous, bleeding or purging is more efficacious in the spring.

48. To catch dysentery is helpful to splenetic patients.

49. The inflammation in all cases of gout subsides within forty days.

50. Laceration of the brain is invariably followed by fever and bilious vomiting.

51. Those in health who are suddenly taken with headache, loss of voice and who show stertorous breathing die within a week unless a fever supervene.

52. Observe the appearance of the eyes during sleep. Should any of the white be visible when the eyelids are closed, provided this be not due to diarrhoea or the taking of a drug, it is a sorry symptom and exceedingly fatal.

53. Raving delirium which is accompanied by laughter is safer; that accompanied by seriousness is more dangerous.

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54. Respiration characterized by a sobbing sound in acute febrile illnesses is a bad sign.
55. Gout is usually most active in spring and autumn.
56. In melancholic diseases, a flow of humours to one part of the body is dangerous in that either apoplexy, a fit, madness or blindness will follow.
57. Apoplexy usually occurs between the ages of forty and sixty.
58. If the mesentery protrude, it invariably rots away.
59. If, in some condition, the hip-joint is dislocated and subsequently reduced again, fluid is formed.
60. If, following chronic pains in the hip, the joint becomes dislocated, the leg wastes away and the patient becomes lame. This may be prevented by the use of the cautery.

Section VII

1. It is a bad sign in acute illnesses when the extremities become cold.
2. It is a bad sign when the flesh becomes livid in the neighbourhood of a diseased bone.
3. It is bad when vomiting is followed by hiccough and bloodshot eyes.
4. Shuddering succeeding on sweating is not good.
5. It is a good thing in cases of madness when dysentery, dropsy or an ecstatic state supervenes.
6. In prolonged illnesses, loss of appetite and unadulterated excreta are bad.
7. A shivering fit and delirium following excessive drinking are bad.
8. The bursting of a tumour internally is accompanied by faintness, vomiting and swooning.
9. It is bad when delirium or spasms follow haemorrhage.
10. It is bad when vomiting, hiccough, fits or delirium be observed in a case of ileus.
11. It is bad when pneumonia supervenes upon pleurisy.
12. It is bad when inflammation of the brain supervenes upon pneumonia.

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13. Fits or tetanus complicating severe burns are bad.
14. Shock or delirium following a blow on the head is bad.
15. It is bad when purulent sputum follows haemoptysis.
16. The production of purulent sputum is followed by consumption. When the sputum ceases, the patient dies.
17. Hiccough is a bad sign in cases of hepatitis.
18. A convulsion or delirium following insomnia is bad.
- 18a. Trembling following lethargy is bad.
19. Inflammation of the tissues following exposure of bone is bad.
20. Erysipelas followed by gangrene or by suppuration is bad.
21. When haemorrhage follows ulcers which throb violently, it is bad.
22. Long-standing pain in the belly followed by suppuration is bad.
23. Unmixed stools followed by dysentery are bad.
24. Delirium follows the fracture of a bone if the ends are not in apposition.
25. A convulsion following the administration of a drug is fatal.
26. It is bad when, following violent abdominal pains, the extremities become cold.
27. In the case of pregnant women, straining at stool may bring about miscarriage.
28. Bones, cartilages and nerves, when divided, will not re-constitute themselves.
29. An attack of diarrhoea puts an end to illnesses attended by the production of white phlegm.
30. The frothiness of the stools in certain cases of diarrhoea is due to substances flowing down from the head.
31. The presence of particles like coarse meal in the urine of patients with fever signifies a long illness.
32. A bilious-looking sediment in a urine which is clear above signifies an acute illness.
33. When the urine shows a deposit, there is some violent disturbance in the body.
34. Bubbles appearing on the surface of the urine indicate disease of the kidneys and a prolonged illness.

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35. A considerable oily scum on the surface of the urine indicates an acute disease of the kidneys.

36. When in diseases of the kidneys the above signs occur together with acute pain in the region of the spinal musculature, an external abscess should be expected so long as the pain is felt superficially. But when the pain is located deeply, then the abscess will be situated deeply.

37. The vomiting of blood is a sign of recovery so long as it is unattended by fever; with fever it is bad. Cure may be effected in the latter case by cooling and the use of astringents.

38. Catarrh of the thoracic organs proceeds to suppuration within twenty days.

39. Patients who complain of strangury and pain in the perineum and in the pubic region, and whose urine contains blood and clots, are suffering from disease in the area round the bladder.

40. If the tongue be suddenly paralysed or if any part of the body be similarly affected, that is a sign of melancholia.

41. It is bad to purge old people so much that hiccough be produced.

42. Unless a fever be due to bile, the pouring of a lot of hot water on the head will end the fever.

43. A woman is never ambidexterous.

44. When empyemata are opened by the cautery or by the knife and the pus flows pure and white, the patient survives. But if it be mixed with blood, muddy and foul-smelling, he will die.

45. Those who are cauterized or cut for suppurating conditions of the liver survive if the pus runs pure and white, for then the abscess is encysted; if however it runs like lees of oil, they die.

46. Pains in the eyes should be treated by the administration of a draught of neat wine, the application of warm douches and the letting of blood.

47. There is no hope when a patient suffering from dropsy develops a cough.

48. Strangury and dysuria are relieved by the taking of neat wine and deep bleeding.

49. The appearance of redness and swelling on the chest is a good sign in cases of sore throat. It means that the disease has turned outwards.

50. Mortification of the brain is commonly followed by death within three days, but if these be survived, recovery will follow.

51. Sneezing occurs when the brain becomes thoroughly heated or when the sinuses become thoroughly moistened or chilled. As a result the air within is pushed out and in so doing makes a noise because its exit is through a narrow passage.

52. Severe pains in the liver disappear if fever supervenes.

53. Where a patient benefits from bleeding, it is best to bleed in spring-time.

54. When phlegm is enclosed between the diaphragm and the stomach causing pain, and is then unable to burst either into the thorax or the belly, it is evacuated by the blood vessels to the bladder and so the disease is resolved.

55. When the liver is full of fluid and this overflows into the peritoneal cavity, so that the belly becomes full of water, death follows.

56. Distress, yawning and shuddering are cured by a draught of wine mixed with an equal quantity of water.

57. The pain due to tumours in the urethra is relieved when they suppurate and burst.

58. Commotion of the brain, from any cause, is inevitably followed by loss of voice.

59. A fit of choking occurring during the course of a fever where there is no swelling of the throat, and which results in the patient being unable to swallow except with great difficulty, is fatal.

59a. If in a patient suffering from a fever the neck be suddenly twisted round and swallowing becomes almost impossible though there is no swelling, then he will die.

60. Those with too much moisture in their flesh should be treated by starvation since starvation dries up the body.

61. Changes from hot to cold and then to hot again, affecting the whole body, or changes of colour signify a long illness.

62. Continual sweating, either hot or cold, means that there

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is an excess of fluid in the body. In the strong this should be removed by inducing vomiting; in the weak by purging.

63. Continued fevers are dangerous if they grow worse every other day; should they however be remittent, in whatever fashion, it means that there is no danger.

64. Prolonged fevers are attended either by swellings or pains in the joints.

65. Those who suffer from swellings or pains of the joints as the result of fever are taking too much food.

66. If the same diet be given to a patient with fever as would be suitable for a healthy man, although it would strengthen the healthy it would cause suffering to the sick.

67. The urine must be observed to see how far it resembles that passed in health. The less it resembles healthy urine, the more diseased it is; the more it resembles it, the healthier it is.

68. Where a sediment composed, as it were, of particles forms in the stools after standing, it is necessary to give a purge. If you give gruel to the patient before having cleansed the belly you do harm and the more you give, the greater the harm.

69. Where the stools are undigested, this is due to black bile. The more pronounced this tendency, the more pronounced the disease.

70. Livid, bloody, foul-smelling or bilious sputum in cases of continued fever is bad. But if healthy sputum come away it is good. Similar principles apply to the intestines and the bladder, for when such substances remain in the body and are not evacuated it is bad.

71. Whenever it is desired to rid the body of unwanted substances, an easy evacuation is desirable. If you wish to drain the thoracic organs, you must make the bowels costive; if you wish to drain the lower organs, you must make the bowels more relaxed.

72. Sleep and wakefulness, exceeding the average, mean disease.

73. Cold skin associated with a high internal temperature and thirst in a patient with continued fever is fatal.

74. If in the course of a continued fever a patient shows

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distortion of the lip, nostril or eye or if the patient, being already weak, lose his sight or his hearing, he will die.

75. Dropsy supervenes on white phlegm.

76. Dysentery succeeds diarrhoea.

77. Lientery succeeds dysentery.

78. A suppurative inflammation of bone succeeds caries.

79-80. The coughing up of blood is followed by consumption and the production of purulent sputum. After consumption comes a discharge from the head and after this, diarrhoea. Following diarrhoea the sputum is no longer produced and when this stops death supervenes.

81. If the urine and the stools are abnormal, or if the discharges of the flesh or any other part of the body are unusual, then a slight deviation means a slight illness, a serious disturbance a serious illness and a very serious change, death.

82. Those who contract inflammation of the brain when over forty never recover. Less risk is run by those at that age and in that state of bodily development when the disease is more usually expected.

83. If during an illness there is weeping voluntarily, it is well. But if weeping occurs in spite of oneself, it is bad.

84. Epistaxis is a bad sign in quartan fevers.

85. Fits of sweating are dangerous when they take place on days other than those of the crisis. They may be very violent, drops of sweat swiftly collecting on the forehead, and the sweat flows away from the body in cold and profuse streams. Such an attack of sweating must necessarily be attended with a violent illness, excessive pain and long-lasting distress.

86. A violent discharge from the bowels is a bad thing when it occurs during continued illness.

87. What drugs will not cure, the knife will; what the knife will not cure, the cautery will; what the cautery will not cure must be considered incurable.

THE SACRED DISEASE

An attack on the popular superstitions about epilepsy, followed by an account of the natural history of the disease.

1. I do not believe that the 'Sacred Disease' is any more divine or sacred than any other disease but, on the contrary, has specific characteristics and a definite cause. Nevertheless, because it is completely different from other diseases, it has been regarded as a divine visitation by those who, being only human, view it with ignorance and astonishment. This theory of divine origin, though supported by the difficulty of understanding the malady, is weakened by the simplicity of the cure, consisting merely of ritual purification and incantation. If remarkable features in a malady were evidence of divine visitation, then there would be many 'sacred diseases', as I shall show. Quotidian, tertian and quartan fevers are among other diseases no less remarkable and portentous and yet no one regards them as having a divine origin. I do not believe that these diseases have any less claim to be caused by a god than the so-called 'sacred' disease but they are not the objects of popular wonder. Again, no less remarkably, I have seen men go mad and become delirious for no obvious reason and do many strange things. I have seen many cases of people groaning and shouting in their sleep, some who choke; others jump from their bed and run outside and remain out of their mind till they wake, when they are as healthy and sane as they were before, although perhaps rather pale and weak. These things are not isolated events but frequent occurrences. There are many other remarkable afflictions of various sorts, but it would take too long to describe them in detail.

2. It is my opinion that those who first called this disease 'sacred' were the sort of people we now call witch-doctors, faith-healers, quacks and charlatans. These are exactly the people who pretend to be very pious and to be particularly

wise. By invoking a divine element they were able to screen their own failure to give suitable treatment and so called this a 'sacred' malady to conceal their ignorance of its nature. By picking their phrases carefully, prescribing purifications and incantations along with abstinence from baths and from many foods unsuitable for the sick, they ensured that their therapeutic measures were safe for themselves. The following fish were forbidden as being the most harmful: mullet, black-tail, hammer and eel. Goat, venison, pork and dog were considered most likely among meats to upset the stomach. Of fowls: cock, turtle-dove and buzzard and those which are considered very rich were forbidden; white mint, garlic and onion were excluded from the diet because over-flavoured food is not good for a sick man. Further, their patients were forbidden to wear black because it is a sign of death, to use goat skin blankets or to wear goat skins, nor were they allowed to put one foot on the other or one hand on the other; and all these things were regarded as preventative measures against the disease. These prohibitions are added on account of the divine element in the malady, suggesting that these practitioners had special knowledge. They also employ other pretexts so that, if the patient be cured, their reputation for cleverness is enhanced while, if he dies, they can excuse themselves by explaining that the gods are to blame while they themselves did nothing wrong; that they did not prescribe the taking of any medicine whether liquid or solid, nor any baths which might have been responsible.

I suppose none of the inhabitants of the interior of Libya can possibly be healthy seeing that they sleep on goat skins and eat goat meat. In fact, they possess neither blanket, garment nor shoe that is not made of goat skin, because goats are the only animals they keep. If contact with or eating of this animal causes and exacerbates the disease while abstinence from it cures the disease, then diet is alone the factor which decides the onset of the disease and its cure. No god can be blamed and the purifications are useless and the idea of divine intervention comes to nought.

3. It seems, then, that those who attempt to cure disease by

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this sort of treatment do not really consider the maladies thus treated of sacred or of divine origin. If the disease can be cured by purification and similar treatment then what is to prevent its being brought on by like devices? The man who can get rid of a disease by his magic could equally well bring it on; again there is nothing divine about this but a human element is involved. By such claims and trickery, these practitioners pretend a deeper knowledge than is given to others; with their prescriptions of 'sanctifications' and 'purifications', their patter about divine visitation and possession by devils, they seek to deceive. And yet I believe that all these professions of piety are really more like impiety and a denial of the existence of the gods, and all their religion and talk of divine visitation is an impious fraud which I shall proceed to expose.

4. If these people claim to know how to draw down the moon, cause an eclipse of the sun, make storms and fine weather, rain and drought, to make the sea too rough for sailing or the land infertile, and all the rest of their nonsense, then, whether they claim to be able to do it by magic or by some other method, they seem to be impious rogues. Either they do not believe in the existence of the gods or they believe that the gods are powerless or would not refrain from the most dastardly acts. Surely conduct such as this must render them hateful to the gods. If a man were to draw down the moon or cause an eclipse of the sun, or make storms or fine weather by magic and sacrifices, I should not call any of these things a divine visitation but a human one, because the divine power has been overcome and forced into subjection by the human will. But perhaps these claims are not true and it is men in search of a living who invent all these fancy tales about this particular disease and all the others too. They make a different god responsible for each of the different forms of the complaint.

If the sufferer acts like a goat, and if he roars, or has convulsions involving the right side, they say the Mother of the Gods is responsible. If he utters a higher-pitched and louder cry, they say he is like a horse and blame Poseidon. If the sufferer should be incontinent of faeces, as sometimes happens

under the stress of an attack, Enodia is the name. If the stools are more frequent and thin like those of birds, it is Apollo Nomius; if he foam at the mouth and kick out with his feet, Ares is to blame. If he suffers at night from fear and panic, from attacks of insanity, or if he jumps out of bed and runs outside, they talk of attacks of Hecate and the assaults of the Heroes. In using purifications and spells they perform what I consider a most irreligious and impious act, for, in treating sufferers from this disease by purification with blood and like things, they behave as if the sufferers were ritually unclean, the victims of divine vengeance or of human magic or had done something sacrilegious. It would have been better if they had done the opposite and taken the sick into the temples, there, by sacrifice and prayer, to make supplication to the gods; instead they simply purify them and do none of these things. Charms are buried in the ground, thrown into the sea or carried off into the mountains where no one may touch them or tread on them. If a god really be responsible, surely these things should be taken into the temples as offerings.

Personally I believe that human bodies cannot be polluted by a god; the basest object by the most pure. But if the human body is polluted by some other agency or is harmed in some way, then the presence of a god would be more likely to purify and sanctify it than pollute it. It is the deity who purifies, sanctifies and cleanses us from the greatest and most unholy of our sins. We ourselves mark out the precincts of the temples of the gods so that no one should enter without purifying himself; as we go in, we sprinkle ourselves with holy water, not because we are thereby polluted, but to rid ourselves of any stain we may have contracted previously. This then is my opinion of the purifications.

5. I believe that this disease is not in the least more divine than any other but has the same nature as other diseases and a similar cause. Moreover, it can be cured no less than other diseases so long as it has not become inveterate and too powerful for the drugs which are given.

Like other diseases it is hereditary. If a phlegmatic child is born of a phlegmatic parent, a bilious child of a bilious parent,

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a consumptive child of a consumptive parent and a splenetic child of a splenetic parent, why should the children of a father or mother who is afflicted with this disease not suffer similarly? The seed comes from all parts of the body; it is healthy when it comes from healthy parts, diseased when it comes from diseased parts. Another important proof that this disease is no more divine than any other lies in the fact that the phlegmatic are constitutionally liable to it while the bilious escape. If its origin were divine, all types would be affected alike without this particular distinction.

6. So far from this being the case, the brain is the seat of this disease, as it is of other very violent diseases. I shall explain clearly the manner in which it comes about and the reason for it.

The human brain, as in the case of all other animals, is double; a thin membrane runs down the middle and divides it. This is the reason why headache is not always located in the same site but may be on either side or, sometimes, affects the whole head. There are a large number of tenuous veins which extend to this structure from all parts of the body; there are also two large vessels, one coming from the liver and one from the spleen. That which comes from the liver is disposed as follows: one half runs down on the right side in relation with the kidney and the lumbar muscles, to reach the inside of the thigh and thence continues to the foot. It is called the 'hollow vein'. The other half courses upwards through the right side of the diaphragm and lies close to the right lung; branches split off to the heart and to the right arm while the remainder passes up behind the clavicle on the right side of the neck and there lies subcutaneously so as to be visible. It disappears close to the ear and then divides; the larger part finishes in the brain while smaller branches go separately to the right ear, the right eye and to the nostril. Such is the distribution of the blood-vessels from the liver. There is also a vein which extends both upwards and downwards from the spleen on the left side of the body; it is similar to that coming from the liver but is thinner and weaker.

7. It is through these blood-vessels that we respire, for they

allow the body to breathe by absorbing air, and it is distributed throughout the body by means of the minor vessels. The air is cooled in the blood-vessels and then released. Air cannot remain still but must move; if it remains still and is left behind in some part of the body, then that part becomes powerless. A proof of this is that if we compress some of the smaller blood-vessels when we are lying or sitting down, so that air cannot pass through the vessels, then numbness occurs at once. Such, then, is the nature of blood-vessels.

8. Now this disease attacks the phlegmatic but not the biliary. Its inception is even while the child is still within its mother's womb, for the brain is rid of undesirable matter and brought to full development, like the other parts, before birth. If this 'cleansing' takes place well and moderately so that neither too much nor too little comes away, the head is most healthy. But if there is too much lost from the whole brain so that a lot of wasting occurs, the head will be feeble and, when the child grows up, he will suffer from noises in the head and be unable to stand the sun or the cold. If the discharge is excessive from one part only, such as an eye or an ear, or one blood-vessel becomes shrivelled up, then whichever part be wasted in that way becomes damaged. On the other hand, if this 'cleansing' does not take place but the material is retained in the brain, a phlegmatic constitution is bound to result.

Sometimes phlegm, which should have been purged out during life in the womb, remains during early life and is only got rid of in the later years. This is what happens in the case of children who suffer from ulcers of the head, ears and flesh, and who salivate and discharge mucus; they get better as they grow older. Those who have been purged of the phlegm in this way are not troubled by this disease, but those who have neither been purged in this way by ulceration and discharges of mucus and saliva, nor have been purged in the womb, are liable to be attacked by it.

9. If these discharges should make their way to the heart, the chest is attacked and palpitation or asthma supervenes; some patients even become hump-backed. For when cold phlegm reaches the lungs and heart, the blood is chilled and the

blood-vessels, as a result of being violently cooled in the region of the lungs and heart, jump and the heart palpitates. Such circumstances force the onset of asthma and diseases characterized by orthopnoea because, until the phlegm which has flowed down has been warmed and dissipated by the blood-vessels, it is impossible to inspire as much air as is needed. When the phlegm has been removed, palpitation and asthma stop. The length of an attack depends upon the quantity of phlegm which has flowed in. The more frequent these discharges of phlegm, the more frequent the attacks. These effects, however, occur only if the discharge makes its way to the lungs and heart; if it reaches the stomach, diarrhoea results.

10. Should these routes for the passage of phlegm from the brain be blocked, the discharge enters the blood-vessels which I have described. This causes loss of voice, choking, foaming at the mouth, clenching of the teeth and convulsive movements of the hands; the eyes are fixed, the patient becomes unconscious and, in some cases, passes a stool. I will explain the reason for each of these signs. Loss of voice occurs when the phlegm suddenly descends in the blood-vessels and blocks them so that air can pass neither to the brain nor to the hollow blood-vessels nor to the body cavities, and thereby inhibits respiration. For when a man draws in breath through the mouth and nose, the air passes first to the brain and then the greater part goes to the stomach, but some flows into the lungs and blood-vessels. From these places it is dispensed throughout the rest of the body by means of the blood-vessels. The air which flows into the stomach cools it but makes no other contribution. But that which goes to the lungs and blood-vessels thence enters the body cavities and the brain and has a further purpose. It induces intelligence and is necessary for the movement of the limbs. Therefore, when the blood-vessels are shut off from this supply of air by the accumulation of phlegm and thus cannot afford it passage, the patient loses his voice and his wits. The hands become powerless and move convulsively for the blood can no longer maintain its customary flow. Divergence of the eyes takes place when the smaller blood-vessels supplying them are shut off and no longer provide

an air supply; the vessels then pulsate. The froth which appears at the lips comes from the lungs for, when air no longer enters them, they produce froth which is expectorated as in the dying. The violence of choking causes the passage of stools; choking is caused by the liver and the thoracic contents compressing the diaphragm and thus obstructing the entry into the stomach. This action results from the amount of air taken in by the mouth being less than normal. When air is shut off in the vessels of the limbs and cannot escape owing to the obstruction of the vessels with phlegm, it moves violently up and down through the blood and the convulsions and pain thus caused produce the kicking movements.

All these symptoms are produced when cold phlegm is discharged into the blood which is warm, so chilling the blood and obstructing its flow. If the cold material is copious and thick, the result is immediately fatal as though its coldness had overcome and congealed the blood. If the quantity is less, however, although at first it may have the upper hand and obstruct respiration, in the end it is dispersed throughout the blood which is plentiful and warm, and if it be overcome in this way, the blood-vessels again take in air and consciousness returns.

11. Infants who suffer from this disease usually die if the phlegm is copious and if the weather is southerly. Their little blood-vessels are too narrow to absorb a large quantity of inspissated phlegm and so the blood is at once chilled and frozen, thus causing death. If the amount of phlegm is small and enters both main vessels, or if it enters but one of them, the patient survives but bears the stigmata. Thus the mouth may be distorted, or an eye, a hand or the neck; according to the part of the body in which some blood-vessel became filled and obstructed with phlegm and thus rendered inadequate. As a result of this damage to the blood-vessel, the corresponding part of the body must necessarily be weakened.

Taking a long view such a happening is generally a good thing because a child is not liable to another attack after an attack which has produced some permanent damage. The reason for this is that the strain of the attack causes injury to

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and some narrowing of the remaining blood-vessels. As a result of this they will no longer admit the entry of phlegm to the same extent although they will admit air. It is, however, only to be expected that such deterioration in the condition of the blood-vessels will lead to some weakening of the limbs.

Those who have a very small discharge at a time when the weather is northerly recover without any permanent injury, but there is a danger in such cases that the disease will remain with the child as he grows older.

Such, then, is the way in which, more or less, this malady affects children.

12. Adults neither die from an attack of this disease, nor does it leave them with palsy. The blood-vessels in patients of this age are capacious and full of hot blood; as a result, the phlegm cannot gain the upper hand and chill and freeze the blood. Instead the phlegm is quickly overcome as it is diluted by the blood, and the vessels take in air again so that consciousness returns and the symptoms mentioned above are less pronounced owing to the strength of the patient.

Attacks of this disease in the aged are not fatal, nor do they cause paralysis. The reason is that the vessels are empty and the blood small in quantity and of thin and watery consistency. Nevertheless, a severe discharge of phlegm in winter may prove fatal if it takes place on both sides of the body by obstructing respiration and congealing the blood. If the discharge takes place on one side only, then, because the blood is too little, too cold and too thin, it cannot overcome the phlegm but instead is itself overcome and frozen. As a result, those parts of the body where the blood is destroyed become powerless.

13. The discharge of phlegm takes place more often on the right side of the body than on the left because the blood-vessels on that side are more numerous and of greater calibre than on the left.

The liquefaction and the subsequent discharge of phlegm occurs specially in children whose heads have been warmed thoroughly either by the sun or at a fire, and have then had the brain suddenly cooled, thus producing a separation of the

phlegm. Although liquefying is produced by warmth and relaxation of the brain, it is the chilling and consolidating which makes the phlegm separate out, and thus causes the discharge. Such is the explanation in some cases; in others, after a period in which the wind has been in the north for some time and then shifts to the south, the brain which is consolidated and healthy becomes soft and relaxed so that there is an overflow of phlegm, thus causing a discharge. A discharge may also occur from obscure causes as when a patient has a fright, or is startled by someone shouting, or when sobs will not let him take in a breath quickly enough, as often happens with children. When such things happen the body immediately becomes cold and loss of voice is succeeded by apnoea. When breathing stops the brain congeals and the blood stops; thus the phlegm is secreted and discharged. Such are the causes of fits from which children at first may suffer.

In older people, the winter is the most dangerous time. When they get their heads and brains warm in front of a roaring fire and then go out and shiver in the cold, or when they come out of the cold into a warm room and a hot fire, the same thing happens for the reasons already given and they have a fit. There is also a grave risk of the same thing happening in the spring as a result of sun-stroke; it is least likely to happen in the summer when there are no sudden variations in temperature. Cases who have been free from the disease in childhood having their first attack after the age of twenty are very rare if not unheard of. At this time of life the vessels are filled with a great quantity of blood while the brain is stiff and solid. There is thus no discharge into the blood vessels or, if there is, it does not overcome the blood because this is so ample and warm.

14. When the disease has been present from childhood, a habit develops of attacks occurring at any change of wind and specially when it is southerly. This is hard to cure because the brain has become more moist than normal and is flooded with phlegm. This renders discharges more frequent. The phlegm can no longer be completely separated out; neither can the brain, which remains wet and soaked, be dried up.

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This observation results specially from a study of animals, particularly of goats which are liable to this disease. Indeed, they are peculiarly susceptible to it. If you cut open the head you will find that the brain is wet, full of fluid and foul-smelling, convincing proof that disease and not the deity is harming the body. It is just the same with man, for when the malady becomes chronic, it becomes incurable. The brain is dissolved by phlegm and liquefies; the melted substance thus formed turns into water which surrounds the brain on the outside and washes round it like the sea round an island. Consequently, fits become more frequent and require less to cause them. The disease therefore becomes very chronic as the fluid surrounding the brain is dilute because its quantity is so great, and as a result it may be quickly overcome by the blood and warmed.

15. Patients who suffer from this disease have a premonitory indication of an attack. In such circumstances they avoid company, going home if they are near enough, or to the loneliest spot they can find if they are not, so that as few people as possible will see them fall, and they at once wrap their heads up in their coats. This is the normal reaction to embarrassment and not, as most people suppose, from fear of the demon. Small children, from inexperience and being unaccustomed to the disease, at first fall down wherever they happen to be. Later, after a number of attacks, they run to their mothers or to someone whom they know well when they feel one coming on. This is through fear and fright at what they feel, for they have not yet learnt to feel ashamed.

16. The reasons for attacks occurring when there is a change of wind are, I believe, the following. Attacks are most likely to occur when the wind is southerly; less when it is northerly, less still when it is in any other quarter; for the south and north winds are the strongest of the winds and the most opposed in direction and in influence. The north wind precipitates the moisture in the air so that the cloudy and damp elements are separated out leaving the atmosphere clear and bright. It treats similarly all the other vapours which arise from the sea or from other stretches of water, distilling out

from them the damp and dark elements. It does the same for human beings and it is therefore the healthiest wind. The south wind has just the opposite effect. It starts by vaporizing the precipitated moisture because it does not generally blow very hard at first. This calm period occurs because the wind cannot immediately absorb the moisture in the air which was previously dense and congealed, but loosens it in time. The south wind has the same effect on the earth, the sea, rivers, springs, wells and everything that grows or contains moisture. In fact, everything contains moisture in a greater or lesser degree and thus all these things feel the effect of the south wind and become dark instead of bright, warm instead of cold and moist instead of dry. Jars in the house or in the cellars which contain wine or any other liquid are influenced by the south wind and change their appearance. The south wind also makes the sun, moon and stars much dimmer than usual.

Seeing that such large and powerful bodies are overcome and that the human body is made to feel changes of wind and undergo changes at that time, it follows that southerly winds relax the brain and make it flabby, relaxing the blood-vessels at the same time. Northerly winds, on the other hand, solidify the healthy part of the brain while any morbid part is separated out and forms a fluid layer round the outside. Thus it is that discharges occur when the wind changes. It is seen, then, that this disease rises and flourishes according to changes we can see come and go. It is no more difficult to understand, nor is it any more divine than any other malady.

17. It ought to be generally known that the source of our pleasure, merriment, laughter and amusement, as of our grief, pain, anxiety and tears, is none other than the brain. It is specially the organ which enables us to think, see and hear, and to distinguish the ugly and the beautiful, the bad and the good, pleasant and unpleasant. Sometimes we judge according to convention; at other times according to the perceptions of expediency. It is the brain too which is the seat of madness and delirium, of the fears and frights which assail us, often by night, but sometimes even by day; it is there where lies the cause of insomnia and sleep-walking, of thoughts that will not

come, forgotten duties and eccentricities. All such things result from an unhealthy condition of the brain; it may be warmer than it should be, or it may be colder, or moister or drier, or in any other abnormal state. Moistness is the cause of madness for when the brain is abnormally moist it is necessarily agitated and this agitation prevents sight or hearing being steady. Because of this, varying visual and acoustic sensations are produced, while the tongue can only describe things as they appear and sound. So long as the brain is still, a man is in his right mind.

18. The brain may be attacked both by phlegm and by bile and the two types of disorder which result may be distinguished thus: those whose madness results from phlegm are quiet and neither shout nor make a disturbance; those whose madness results from bile shout, play tricks and will not keep still but are always up to some mischief. Such are the causes of continued madness, but fears and frights may be caused by changes in the brain. Such a change occurs when it is warmed and that is the effect bile has when, flowing from the rest of the body, it courses to the brain along the blood-vessels. Fright continues until the bile runs away again into the blood-vessels and into the body. Feelings of pain and nausea result from inopportune cooling and abnormal consolidation of the brain and this is the effect of phlegm. The same condition is responsible for loss of memory. Those of a bilious constitution are liable to shout and to cry out during the night when the brain is suddenly heated; those of phlegmatic constitution do not suffer in this way. Warming of the brain also takes place when a plethora of blood finds its way to the brain and boils. It courses along the blood-vessels I have described in great quantity when a man is having a nightmare and is in a state of terror. He reacts in sleep in the same way that he would if he were awake; his face burns, his eyes are bloodshot as they are when scared or when the mind is intent upon the commission of a crime. All this ceases as soon as the man wakes and the blood is dispersed again into the blood-vessels.

19. For these reasons I believe the brain to be the most potent organ in the body. So long as it is healthy, it is the

interpreter of what is derived from the air. Consciousness is caused by air. The eyes, ears, tongue, hands and feet perform actions which are planned by the brain, for there is a measure of conscious thought throughout the body proportionate to the amount of air which it receives. The brain is also the organ of comprehension, for when a man draws in a breath it reaches the brain first, and thence is dispersed into the rest of the body, having left behind in the brain its vigour and whatever pertains to consciousness and intelligence. If the air went first to the body and subsequently to the brain, the power of understanding would be left to the flesh and to the blood-vessels; it would only reach the brain hot and when it was no longer pure owing to admixture with fluid from the flesh and from the blood and this would blunt its keenness.

20. I therefore assert that the brain is the interpreter of comprehension. Accident and convention have falsely ascribed that function to the diaphragm* which does not and could not possess it. I know of no way in which the diaphragm can think and be conscious, except that a sudden access of pleasure or of pain might make it jump and throb because it is so thin and is under greater tension than any other part of the body. Moreover, it has no cavity into which it might receive anything good or bad that comes upon it, but the weakness of its construction makes it liable to disturbance by either of these forces. It is no quicker in perception than any other part of the body, and its name and associations are quite unwarranted, just as parts of the heart are called auricles though they make no contribution to hearing. Some say too that we think with our hearts and it is the heart which suffers pain and feels anxiety. There is no truth in this although it is convulsed as is the diaphragm and even more for the following reasons: blood-vessels from all parts of the body run to the heart and these connections ensure that it can feel if any pain or strain occurs in the body. Moreover, the body cannot help giving a shudder and a contraction when subjected to pain and the same effect is produced by an excess of joy, which heart and diaphragm

*Gk *phrenes* (diaphragm) is frequently used for 'mind' in the widest sense. The words for thinking, consciousness, etc., are closely connected.

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feel most intensely. Neither of these organs takes any part in mental operations, which are completely undertaken by the brain. As then the brain is the first organ in the body to perceive the consciousness derived from the air, if the seasons cause any violent change in the air, the brain undergoes its greatest variations. This is my reason for asserting that the diseases which attack the brain are the most acute, most serious and most fatal, and the hardest problem in diagnosis for the unskilled practitioner.

21. This so-called 'sacred disease' is due to the same causes as all other diseases, to the things we see come and go, the cold and the sun too, the changing and inconstant winds. These things are divine so that there is no need to regard this disease as more divine than any other; all are alike divine and all human. Each has its own nature and character and there is nothing in any disease which is unintelligible or which is insusceptible to treatment. The majority of maladies may be cured by the same things as caused them. One thing nourishes one thing, another another and sometimes destroys it too. The physician must know of these things in order to be able to recognize the opportune moment to nourish and increase one thing while robbing another of its sustenance and so destroying it.

In this disease as in all others, it should be your aim not to make the disease worse, but to wear it down by applying the remedies most hostile to the disease and those things to which it is unaccustomed. A malady flourishes and grows in its accustomed circumstances but is blunted and declines when attacked by a hostile substance. A man with the knowledge of how to produce by means of a regimen dryness and moisture, cold and heat in the human body, could cure this disease too provided that he could distinguish the right moment for the application of the remedies. He would not need to resort to purifications and magic spells.

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This short treatise on the medical significance of dreams forms the conclusion to a long work on Regimen; this explains the numbering of the paragraphs, and the last sentence must be understood to refer to the whole work.

86. Accurate knowledge about the signs which occur in dreams will be found very valuable for all purposes. While the body is awake, the soul is not under its own control, but is split into various portions each being devoted to some special bodily function such as hearing, vision, touch, locomotion and all the various actions of the body. But when the body is at rest, the soul is stirred and roused and becomes its own master, and itself performs all the functions of the body. When the body is sleeping it receives no sensations, but the soul being awake at that time perceives everything; it sees what is visible, it hears what is audible, it walks, it touches, it feels pain and thinks. In short, during sleep the soul performs all the functions of both body and soul. A correct appreciation of these things implies considerable wisdom.

87. There are special interpreters, with their own science of these matters, for the god-given dreams which give to cities or to individuals foreknowledge of the future. Such people also interpret the signs derived from the soul which indicate bodily states; excess or lack of what is natural, or of some unusual change. In such matters they are sometimes right and sometimes wrong, but in neither case do they know why it happens, whether they are right or wrong, but nevertheless they give advice so you shall 'beware of taking harm'. Yet they never show you how you ought to beware, but merely tell you to pray to the gods. Prayer is a good thing, but one should take on part of the burden oneself and call on the gods only to help.

88. The facts about dreams are as follows: those that merely

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consist of a transference to the night of a person's daytime actions and thoughts, which continue to happen in normal fashion just as they were done and thought during the day, are good for they indicate a healthy state. This is because the soul remains true to its daytime cogitations, and is overcome neither by excess nor by emptiness, nor by any other extraneous circumstance. But when dreams take on a character contrary to daytime activities and involve conflict or victory over them, then they constitute a sign of bodily disturbance. The seriousness of the conflict is an indication of the seriousness of the mischief. Now concerning this, I make no judgement whether or not you ought to avert the consequence by appropriate rites or not. But I do advise treatment of the body, for an excretion resulting from some bodily superfluity has disturbed the soul. If the opposing force be strong, it is a good thing to give an emetic and to administer a gradually increasing light diet for five days, to order frequent early-morning walks gradually becoming more brisk, and gymnastics for those accustomed to this form of exercise, proportionate in severity to the increase of diet. If the opposing force be weaker, dispense with the emetic, reduce the diet by a third and restore the cut by a gradual measure over five days. Strenuous walks and the use of vocal exercises will put an end to the disturbance.

89. It is a good sign to see the sun, moon, sky and stars clear and undimmed, each being placed normally in its right place, since it shows that the body is well and free from disturbing influences. But it is necessary to follow a régime which will ensure that such a condition is maintained. On the contrary, if any of these celestial bodies appear displaced or changed then such a sign indicates bodily disease, the severity of which depends upon the seriousness of the interference.

Now the orbit of the stars is the outermost, that of the sun is intermediate, while that of the moon is nearest to the hollow vault of the sky. Should one of the stars seem to be injured, or should it disappear or stop in its revolution as a result of mist or cloud, this is a weak sign. If such a change be produced by rain or hail, it is stronger and signifies that an excretion

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of moisture and phlegm has occurred into the corresponding outermost parts. In such cases, prescribe long runs well wrapped up, increasing the exercise so as to cause as much sweating as possible. The exercise should be followed by long walks and the patient should go without breakfast. Food should be cut by a third and the normal diet restored gradually over five days. If the disorder appears more severe, prescribe vapour baths in addition. It is advisable to cleanse through the skin because the harm is in the outermost parts. Therefore prescribe dry, pungent, bitter, undiluted foods and the most dehydrating exercises.

If the moon is involved, it is advisable to draw off the harmful matter internally; therefore to use an emetic following the administration of pungent, salty and soft foods. Also, prescribe brisk runs on a circular track, walks and vocal exercises. Forbid breakfast and reduce the food intake, restoring it as before. The cleansing should be done internally because the harm appeared in the hollows of the body.

If the sun encounters any of these changes, the trouble is more violent and less easy to expel. The drawing-off should be produced both ways; prescribe runs on the stadium track and on the circular track, walks and all other forms of exercise. Give an emetic, cut the food and restore the diet gradually over five days as before.

If the heavenly bodies are seen dimly in a clear sky, and shine weakly and seem to be stopped from revolving by dryness, then it is a sign that there is a danger of incurring sickness. Exercise should be stopped while a fluid diet, frequent baths and plenty of rest and sleep should be prescribed until there is a return to normal.

If the heavenly bodies are opposed by a fiery atmosphere, the excretion of bile is indicated. If the opposing powers get the upper hand, sickness is portended; but if they completely overcome the stars and these vanish, then there is danger that the sickness may terminate fatally. If the opposing influences, however, are put to flight and it seems as if they are pursued by the heavenly bodies, then there is danger of the patient going mad unless he be treated. In all these cases, it is best to

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start treatment by purging with hellebore. If this is not done, the diet should be fluid and no wine should be taken unless it be white, thin, soft and watery. Warm, pungent, dehydrating and salt things should be avoided. Prescribe as much natural exercise as possible and plenty of runs with the patients well wrapped-up. Avoid massage, wrestling and wrestling in dust. Soften them with plenty of sleep and, apart from natural exercise, let them rest. Let them take a walk after dinner. It is also good to take a vapour bath followed by an emetic. For thirty days the patient should not eat his fill, but when he is restored to a full diet he should take an emetic thrice monthly after partaking of a sweet, fluid and light meal.

When the heavenly bodies wander in different directions, some mental disturbance as a result of anxiety is indicated. In this case, ease is beneficial. The soul should be turned to entertainments, especially amusing ones, or failing these, any that may give special pleasure, for two or three days. This may effect a cure; if not, the mental anxiety may engender disease.

It is a sign of health if a star, which is clear and bright, appears to fall out of its orbit and to move eastwards. The separation of any clear substance and its natural excretion from the body is good. Thus excretion of substances into the bowels and the formation of abscessions in the skin are examples of things falling out of their orbit.

It is a sign of sickness if the star appears dark and dim and moves either westward, or down into the earth or sea, or upwards. Upward movement indicates fluxes in the head; movement into the sea, disease of the bowels; earthward movement, the growing of tumours in the flesh. In these cases it is wise to reduce the food intake by a third and, after an emetic, to increase it over five days. Then a normal diet should be taken for a further five days, after which another emetic should be taken followed by an increase in the same way.

It is a healthy sign if any of the heavenly bodies appears clear and moist, because the influx from the ether acting on the person is clear and the soul perceives this as it enters. If it be dark, and not clean and transparent, then sickness is indicated, not due to some internal excess or lack of something,

but coming from the external environment. In this case it is advisable to take brisk runs on a circular track so as to restrict the wasting of the body. Also, the quickened respiration causes excretion of the intruding influence, and brisk walks should follow the runs. The diet should be soft and light, being increased to reach the normal in four days.

When a person appears to receive something pure from a pure deity, it is good for health because it means that the things entering his body are pure. If he seems to see the opposite of this, it is not good because it indicates that some element of disease has entered his body. Such a case should be treated as the one described above.

If it seems to rain with gentle rain from clear skies, and without any violent downpour or heavy storm, it is good. Such indicates that the breath drawn from the air is proportionate and pure. If the reverse happens, violent rain, storm and tempest, and the rain is not clear, it indicates the onset of disease from the respired air. A similar régime should be prescribed for this sort of case and very little food should be taken.

From the information which comes from this knowledge of the heavenly bodies, one must take precautions and follow the prescribed regimens. Pray to the gods: when the signs are good to the Sun, to Zeus of the sky, Zeus of the home, Athena of the home, to Hermes and Apollo. When the signs are the opposite, pray to the gods who avert evil, to Earth and to the Heroes, that all ills may be turned aside.

90. The following are some of the signs that foretell health: to see clearly and to hear distinctly things on the earth, to walk safely and to run safely and swiftly without fear, to see the earth smooth and well tilled and trees flourishing, laden with fruit and well-kept; to see rivers flowing normally with water clear and neither in flood nor with their flow lessened, and springs and wells similarly. All these things indicate the subject's health, and that the body, its flows, the food ingested and the excreta, are normal.

Anything seen which is the contrary, however, indicates something wrong in the body. Interference with sight or

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hearing indicates some malady of the head and longer early morning and after dinner walks than in the previous regimen should be ordered. If the legs are harmed, a contrary pull should be exerted by emetics and a greater indulgence in wrestling. Rough land indicates impurity in the flesh; longer walks after exercise should be ordered.

Trees that do not bear fruit indicate destruction of the human semen; if the trees are losing their leaves the cause of the trouble is wet and cold; if they are flourishing but barren, heat and dryness. In the one case, the regimen should aim at warming and drying; in the other, at cooling and moistening.

Abnormality in rivers relates to the flow of the blood. If the flow of a river be greater than usual, a superfluity of blood; if it be less, a deficiency. The regimen should aim at a decrease or an increase respectively. If the water is cloudy, some disturbance is indicated. This can be remedied by runs on a track or by walking; increased breathing disperses it.

Springs and wells relate to the bladder and in these cases diuretics should be employed.

A rough sea indicates disease of the bowels. Light and gentle laxatives should be used to effect a thorough purgation.

An earth-tremor or the shaking of a house predicts the onset of sickness when it is observed by a healthy man; a change and the restoration of health for a sick one. In the healthy, it is wise to change the regimen because it is the existing régime which is disturbing the whole body; therefore first give an emetic so that, after this, he may be fed up again gradually. But in the case of a sick man, because the body itself is undergoing a change, the same regimen should be continued.

To see land flooded with water or by the sea is a sign of illness, indicating excess fluid in the body. Prescribe emetics, fasting, exercise and a dry diet increasing little by little. Nor is it good to see the earth looking black or scorched; this shows excessive dehydration of the body and there is the risk of severe or fatal illness. Stop exercise and forbid all dry, pungent and diuretic food. Prescribe boiled barley-water and a small quantity of light food together with plenty of watery

white wine to drink and lots of baths. The patient should not bath till he has eaten; then let him lie soft and relax, avoiding cold and sun. Pray to Earth, Hermes and the Heroes. To dream of diving into a lake, the sea or rivers is not a good sign as it too indicates an excess of moisture. It is advisable to use a dehydrating regimen and more exercise. In those suffering from fever, however, it is a good sign, indicating that the heat is being quenched by moisture.

91. It is a good sign for health to see anything normal about one's clothing, the size being neither too large nor too small but in accordance with one's own size. It is good to have white garments of one's own and the finest footwear. Anything too large or too small for one's limbs is not good; in the one case the regimen should aim at a decrease, and in the other, an increase. Black things indicate a more sickly or dangerous condition. Softening and moistening measures should be applied. New things denote a change.

92. To see the dead, clean, in white clothes, is good; while to receive something clean from them denotes health both of the body and the things which enter it. This is because the dead are a source of nourishment, increase and propagation, and it is a sign of health that what enters the body should be clean. On the contrary, if the dead appear naked, or in dark garments, or unclean, or taking or carrying anything out of the house, this is an inexpedient sign indicating disease because the things entering the body are harmful. These should be purged away by circular runs and walks and, after an emetic, a soft and light diet should be given which is gradually increased.

93. The appearance of monstrous creatures which appear during sleep and frighten the dreamer indicate a surfeit or unaccustomed food, a secretion, cholera and a dangerous illness. An emetic should be followed by an increasing diet of the lightest foods for five days; the food should neither be excessive nor pungent, nor dry nor warm. Prescribe also exercise, especially natural exercise, but not walks after dinner. Warm baths and relaxation are also advisable, and both the sun and the cold should be avoided.

To seem, while sleeping, to eat or to drink one's normal diet

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indicates undernourishment and a mental hunger. The stronger the meats seem, the greater the degree of inadequacy of the diet; weaker meats indicate a smaller deficiency, as if it were good to partake of whatever were seen in the dream....*

The diet should therefore be reduced, as it indicates a surfeit of nourishment. To dream of loaves made with cheese and honey has a similar significance.

Drinking clear water is not harmful; all other sorts of water are. Any normal things seen in a dream indicate a similar appetite of the soul.

If the dreamer flies in fright from anything, this means an obstruction to the blood as a result of dehydration. It is then wise to cool and moisten the body.

Fighting, being stabbed or bound by another indicates that some secretion, inimical to the flows, has taken place into the body. It is then advisable to take an emetic, to go on a reducing diet and to go for walks. A light diet, increasing over four days, should be taken after the emetic. Wandering and difficult climbs have the same meaning.

Fording rivers, enemy soldiers and monstrous apparitions denote illness or madness. After an emetic give a small diet of light soft food, increasing gently for five days, together with plenty of natural exercise – except walks after dinner – warm baths and relaxation. Avoid cold and sun.

By following the instructions I have given, one may live a healthy life; and I have discovered the best regimen that can be devised by a mere mortal with the help of the gods.

*A sentence is probably lost here.

THE NATURE OF MAN

A popular lecture on physiology

1. This lecture is not intended for those who are accustomed to hear discourses which inquire more deeply into the human constitution than is profitable for medical study. I am not going to assert that man is all air, or fire, or water, or earth, or in fact anything but what manifestly composes his body; let those who like discuss such matters. Nevertheless, when these things are discussed I perceive a certain discrepancy in the analyses for, although the same theory is employed, the conclusions do not agree. They all, theorizing, draw the same deduction, asserting that there is one basic substance which is unique and the basis of everything; but they call it by different names, one insisting that it is air, another that it is fire, another water, another earth. Each adds arguments and proofs to support his contention, all of which mean nothing. Now, whenever people arguing on the same theory do not reach the same conclusion, you may be sure that they do not know what they are talking about. A good illustration of this is provided by attending their disputations when the same disputants are present and the same audience; the same man never wins the argument three times running, it is first one and then the other and sometimes the one who happens to have the glibbest tongue. Yet it would be expected that the man who asserts that he can provide the correct explanation of the subject, if, that is, he really knows what he is talking about and demonstrates it correctly, should always win the argument. I am of the opinion that these people wreck their own theories on the problem of the terms they use for the One because they fail to understand the issue. Thus they serve, rather, to establish the theory of Melissus.*

*Flourished about 440 B.C.; like Parmenides, he denied plurality and change and held that what is is one and unchanging.

2. I need say no more about these theorists. But when we come to physicians, we find that some assert that man is composed of blood, others of bile and some of phlegm. But these, too, all make the same point, asserting that there is a basic unity of substance, although they each give it a different name and so change its appearance and properties under stress of heat and cold, becoming sweet or bitter, white or black, and so forth. Now I do not agree with these people either, although the majority will declare that this, or something very similar, is the case. I hold that if man were basically of one substance, he would never feel pain, since, being one, there would be nothing to hurt. Moreover, if he should feel pain, the remedy likewise would have to be single. But in fact there are many remedies because there are many things in the body which when abnormally heated, cooled, dried or moistened by interaction, engender disease. As a result, disease has a plurality of forms and a plurality of cures.

I challenge the man who asserts that blood is the sole constituent of the human body, to show, not that it undergoes changes into all sorts of forms, but that there is a time of year or of human life when blood is obviously the sole constituent of the body. It is reasonable to suppose, were this theory true, that there is one period at which it appears in its proper form. The same applies to those who make the body of phlegm or bile.

I propose to show that the substances I believe compose the body are, both nominally and essentially, always the same and unchanging; in youth as well as in age, in cold weather as well as in warm. I shall produce proofs and demonstrate the causes both of the growth and decline of each of the constituents of the body.

3. In the first place, generation cannot arise from a single substance. For how could one thing generate another unless it copulated with some other? Secondly, unless the things which copulated were of the same species and had the same generative capabilities, we should not get these results. Again, generation would be impossible unless the hot stood in a fair and reasonable proportion to the cold, and likewise the dry to

the wet; if, for instance, one preponderated over the other, one being much stronger and the other much weaker. Is it likely, then, that anything should be generated from one thing, seeing that not even a number of things suffice unless they are combined in the right proportions? It follows, then, such being the nature of the human body and of everything else, that man is not a unity but each of the elements contributing to his formation preserves in the body the power which it contributed. It also follows that each of the elements must return to its original nature when the body dies; the wet to the wet, the dry to the dry, the hot to the hot and the cold to the cold. The constitution of animals is similar and of everything else too. All things have a similar generation and a similar dissolution, for all are formed of the substances mentioned and are finally resolved in the same constituents as produced them; that too is how they disappear.

4. The human body contains blood, phlegm, yellow bile and black bile. These are the things that make up its constitution and cause its pains and health. Health is primarily that state in which these constituent substances are in the correct proportion to each other, both in strength and quantity, and are well mixed. Pain occurs when one of the substances presents either a deficiency or an excess, or is separated in the body and not mixed with the others. It is inevitable that when one of these is separated from the rest and stands by itself, not only the part from which it has come, but also that where it collects and is present in excess, should become diseased, and because it contains too much of the particular substance, cause pain and distress. Whenever there is more than slight discharge of one of these humours outside the body, then its loss is accompanied by pain. If, however, the loss, change or separation from the other humours is internal, then it inevitably causes twice as much pain, as I have said, for pain is produced both in the part whence it is derived and in the part where it accumulates.

5. Now I said that I would demonstrate that my proposed constituents of the human body were always constant, both nominally and essentially. I hold that these constituents are

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blood, phlegm and yellow and black bile. Common usage has assigned to them specific and different names because there are essential differences in their appearance. Phlegm is not like blood, nor is blood like bile, nor bile like phlegm. Indeed, how could they be alike when there is no similarity in appearance and when they are different to the sense of touch? They are dissimilar in their qualities of heat, cold, dryness and moisture. It follows then that substances so unlike in appearance and characteristics cannot basically be identical, at least if fire and water are not identical. As evidence of the fact that they are dissimilar, each possessing its own qualities and nature, consider the following case. If you give a man medicine which brings up phlegm, you will find his vomit is phlegm; if you give him one which brings up bile, he will vomit bile. Similarly, black bile can be eliminated by administering a medicine which brings it up, or, if you cut the body so as to form an open wound, it bleeds. These things will take place just the same every day and every night, winter and summer, so long as the subject can draw breath and expel it again, or until he is deprived of any of these congenital elements. For they must be congenital, firstly because it is obvious that they are present at every age so long as life is present and, secondly, because they were procreated by a human being who had them all and mothered in a human being similarly endowed with all the elements which I have indicated and demonstrated.

6. Those who assert that the human body is a single substance seem to have reasoned along the following lines. Having observed that when men died from excessive purgation following the administration of drugs, some vomited bile and some phlegm, they concluded from this that whatever was the nature of the material voided at death, this was indeed the fundamental constituent of man. Those who insist that blood is the basic substance use a similar argument; because they see blood flowing from the body in the fatally wounded, they conclude that blood constitutes the soul. They all use similar arguments to support their theories. But, to begin with, no one ever yet died from excessive purgation and brought up only bile; taking medicine which causes the bringing up

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of bile, produces first the vomiting of bile, but subsequently, the vomiting of phlegm as well. This is followed by the vomiting of black bile in spite of themselves and they end up by vomiting pure blood and that is how they die. The same effects result from taking a drug which brings up phlegm; the vomiting of phlegm is followed by yellow bile, then black bile, then pure blood, and so death ensues. When a drug is ingested, it first causes the evacuation of whatever in the body is naturally suited to it, but afterwards, it causes the voiding of other substances too. It is similar in the case of plants and seeds; when these are put into the ground, they first absorb the things which naturally suit them; they may be acid, bitter, sweet, salty and so forth. But although at first the plant takes what is naturally suited to it, afterwards it absorbs other things as well. The action of drugs in the body is similar; those which cause the bringing up of bile at first bring it up undiluted, but later on it is voided mixed with other substances; the same is true of drugs which bring up phlegm. In the case of men who have been fatally wounded the blood at first runs very warm and red, but subsequently it becomes more like phlegm and bile.

7. Now the quantity of phlegm in the body increases in winter because it is that bodily substance most in keeping with the winter, seeing that it is the coldest. You can verify its coldness by touching phlegm, bile and blood; you will find that the phlegm is the coldest. It is however the most viscous and is brought up with greater force than any other substance with the exception of black bile. Although those things which are forcibly expelled become warmer owing to the force to which they are subjected, nevertheless phlegm remains the coldest substance, and obviously so, owing to its natural characteristics. The following signs show that winter fills the body with phlegm: people spit and blow from their noses the most phlegmatic mucus in winter; swellings become white especially at that season and other diseases show phlegmatic signs.

During the spring, although the phlegm remains strong in the body, the quantity of blood increases. Then, as the cold becomes less intense and the rainy season comes on, the wet

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and warm days increase further the quantity of blood. This part of the year is most in keeping with blood because it is wet and hot. That this is so, you can judge by these signs: it is in spring and summer that people are particularly liable to dysentery and to epistaxis, and these are the seasons too at which people are warmest and their complexions are ruddiest.

During the summer, the blood is still strong but the bile gradually increases, and this change continues into the autumn when the blood decreases since the autumn is contrary to it. The bile rules the body during the summer and the autumn. As proof of this, it is during this season that people vomit bile spontaneously, or, if they take drugs, they void the most biliary sort of matter. It is plain too from the nature of fevers and from people's complexions in that season. During the summer, the phlegm is at its weakest since this season, on account of its dryness and heat, is most contrary to that substance.

The blood in the body reaches its lowest level in autumn, because this is a dry season and the body is already beginning to cool. Black bile is strongest and preponderates in the autumn. When winter sets in the bile is cooled and decreases while the phlegm increases again owing to the amount of rain and the length of the nights.

All these substances, then, are all always present in the body but vary in their relative quantities, each preponderating in turn according to its natural characteristics. The year has its share of all the elements: heat, cold, dryness and wetness. None of these could exist alone for a moment, while, on the other hand, were they missing, all would disappear, for they are all mutually interdependent. In the same way, if any of these primary bodily substances were absent from man, life would cease. And just as the year is governed at one time by winter, then by spring, then by summer and then by autumn; so at one time in the body phlegm preponderates, at another time blood, at another time yellow bile and this is followed by the preponderance of black bile. A very clear proof of this can be obtained by giving the same man the same emetic at four different times in the year; his vomit will be most phlegmatic

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in winter, most wet in spring, most bilious in summer and darkest in autumn.

8. In these circumstances it follows that the diseases which increase in winter should decrease in summer and vice versa. Those which come to an end in a given number of days are exceptions and I will discuss periodicity later on. You may expect diseases which begin in spring to end in the autumn; likewise autumnal diseases will disappear in the spring. Any disease which exceeds these limits must be put down as belonging to a whole year. In applying his remedies, the physician must bear in mind that each disease is most prominent during the season most in keeping with its nature.

9. In addition to these considerations, certain further points should be known. Diseases caused by over-eating are cured by fasting; those caused by starvation are cured by feeding up. Diseases caused by exertion are cured by rest; those caused by indolence are cured by exertion. To put it briefly: the physician should treat disease by the principle of opposition to the cause of the disease according to its form, its seasonal and age incidence, countering tenseness by relaxation and vice versa. This will bring the patient most relief and seems to me to be the principle of healing.

Some diseases are produced by the manner of life that is followed; others by the life-giving air we breathe. That there are these two types may be demonstrated in the following way. When a large number of people all catch the same disease at the same time, the cause must be ascribed to something common to all and which they all use; in other words to what they all breathe. In such a disease, it is obvious that individual bodily habits cannot be responsible because the malady attacks one after another, young and old, men and women alike, those who drink their wine neat and those who drink only water; those who eat barley-cake as well as those who live on bread, those who take a lot of exercise and those who take but little. The régime cannot therefore be responsible where people who live very different lives catch the same disease.

However, when many different diseases appear at the same time, it is plain that the regimen is responsible in individual

cases. Treatment then should aim at opposing the cause of the disease as I have said elsewhere; that is, treatment should involve a change in regimen. For, in such a case, it is obvious that all, most, or at least one of the factors in the regimen does not agree with the patient; such must be sought out and changed having regard to the constitution of the patient, his age and appearance, the season of the year and the nature of the disease. The treatment prescribed should vary accordingly by lessening this or increasing that, and the regimen and drugs should be appropriately adapted to the various factors already mentioned.

When an epidemic of one particular disease is established, it is evident that it is not the regimen but the air breathed which is responsible. Plainly, the air must be harmful because of some morbid secretion which it contains. Your advice to patients at such a time should be not to alter the regimen since this is not to blame, but they should gradually reduce the quantity of food and drink taken so that the body is as little loaded and as weak as possible. A sudden change of regimen involves the risk of starting a fresh complaint, so you should deal with the regimen in this way when it is clearly not the cause of the patient's illness. Care should be taken that the amount of air breathed should be as small as possible and as unfamiliar as possible. These points may be dealt with by making the body thin so that the patient will avoid large and frequent breaths, and, wherever practicable, by a change of station from the infected area.

10. The most serious diseases are those which arise from the strongest part of the body, since if a disease remains in the place where it begins, it is inevitable that the whole body should sicken if its strongest part does. Alternatively, if the disease passes from the stronger part to a weaker part, it proves difficult to dispel. Those which pass from a weak part to a stronger are more easily cured because the in-flowing humours are easily spent by the strength of the part.

11. The blood-vessels of largest calibre, of which there are four pairs in the body, are arranged in the following way: one pair runs from the back of the head, through the neck, and,

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weaving its way externally along the spine, passes into the legs, traverses the calves and the outer aspect of the ankle, and reaches the feet. Venesection for pains in the back and loins should therefore be practised in the hollow of the knee or externally at the ankle.

The second pair of blood-vessels runs from the head near the ears through the neck, where they are known as the jugular veins. Thence they continue deeply close to the spine on either side. They pass close to the muscles of the loins, entering the testicles and the thighs. Thence they traverse the popliteal fossa on the medial side and passing through the calves lie on the inner aspect of the ankles and the feet. Venesection for pain in the loin and in the testicles should therefore be done in the popliteal area or at the inner side of the ankle.

The third pair of blood-vessels runs from the temples, through the neck and under the shoulder-blades. They then come together in the lungs; the right-hand one crossing to the left, the left-hand one crossing to the right. The right-hand one proceeds from the lungs, passes under the breast and enters the spleen and the kidneys. The left-hand one proceeds to the right on leaving the lungs, passes under the breast and enters the liver and the kidneys. Both vessels terminate in the anus.

The fourth pair runs from the front of the head and the eyes, down the neck and under the clavicles. They then course on the upper surface of the arms as far as the elbows, through the forearms into the wrists and so into the fingers. They then return from the fingers running through the ball of the thumb and the forearms to the elbows where they course along the inferior surface of the arms to the axillae. Thence they pass superficially down the sides, one reaching the spleen and its fellow the liver. Thence they course over the belly and terminate in the pudendal area.

Apart from the larger vessels which are thus accounted for, there are a large number of vessels of all sizes running from the belly to all parts of the body; these carry foodstuffs to the body. They also form connections between the large main vessels which run to the belly and the rest of the body. In

addition they join up with each other and form connections between the deep and superficial vessels.

The following are therefore rules for venesection. Care should be taken that the cuts are as close as possible to the determined source of the pain and the place where the blood collects. By doing this a sudden, violent change is avoided but at the same time the customary site of collection of blood will be changed.

12. If a patient over the age of thirty-five expectorates much without showing fever, passes urine exhibiting a large quantity of sediment painlessly, or suffers continuously from bloody stools as in cases of dysentery, his complaint will arise from the following single cause. He must, when a young man, have been hard-working, fond of physical exertion and work and then, on dropping the exercises, have run to soft flesh very different from that which he had before. There must be a sharp distinction between his previous and his present bodily physique so that the two do not agree. If a person so constituted contracts some disease, he escapes for the time being but, after the illness, the body wastes. Fluid matter then flows through the blood-vessels wherever the widest way offers. If it makes its way to the lower bowel it is passed in the stools in much the same form as it was in the body; as its course is downwards it does not stay long in the intestines. If it flows into the chest, suppuration results because, owing to the upward tread of its path, it spends a long time in the chest and there rots and forms pus. Should the fluid matter, however, be expelled into the bladder, it becomes warm and white owing to the warmth of that region. It becomes separated in the urine; the lighter elements float and form a scum on the surface while the heavier constituents fall to the bottom forming pus.

Children suffer from stones owing to the warmth of the whole body and of the region about the bladder in particular. Adult men do not suffer from stone because the body is cool; it should be thoroughly appreciated that a person is warmest the day he is born and coldest the day he dies. So long as the body is growing and advancing towards strength it is necessarily warm; but when it begins to wither and to fade away to

feebleness, it cools down. From this principle it follows that a person is warmest the day he is born because he grows most on that day; he is coldest the day he dies because on that day he withers most.

People of the constitution mentioned above, that is athletic people who have got soft, generally recover of their own accord within forty-five days of the wasting beginning. If such a period be exceeded, natural recovery takes a year so long as no other malady intervenes.

13. Prognosis is safest to foretell in those diseases which develop quickly and those whose causes are apparent. They should be cured by opposing whatever is the cause of the disease, of which the body will thus be rid.

14. The presence of a sandy sediment or of stones in the urine means that originally tumours grew in relation to the aorta and suppurred. Then, because the tumour did not burst rapidly, stones were formed from the pus and these were squeezed out through the blood-vessels together with urine into the bladder. When the urine is only blood-stained, the blood-vessels have been attacked. Sometimes the urine is thick and small hair-like pieces of flesh are voided with it which, it must be realized, come from the kidneys and the joints. When in an otherwise clear urine, a substance like bran is present in it, the bladder is inflamed.

15. Most fevers are caused by bile. Apart from those arising from local injury, they are of four types. These are called continued, quotidian, tertian and quartan.

Continued fever is produced by large quantities of the most concentrated bile and the crisis is reached in the shortest time; as the body enjoys no periods of coolness, the great heat it endures results in rapid wasting.

Quotidian fever is caused by a large quantity of bile, but less than that which causes continued fever. This is quicker than the others to depart although it lasts longer than a continued fever by as much as there is less bile causing it, and because the body has some respite from the fever whereas continued fever allows none.

Tertian fever lasts longer than quotidian fever and is caused

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by less bile. A tertian fever is longer in proportion to the longer respites from fever allowed to the body compared with quotidian fevers.

Quartans behave similarly to the tertians but last longer, as they arise from still less of the heat-producing bile and because they give the body longer respites in which to cool down. A secondary reason for their chronic character and difficult resolution is that they are caused by black bile; this is the most viscous of the humours in the body and remains the longest. As evidence of this note the association of quartan fevers with melancholy. Quartan fever has its highest incidence in the autumn and in those between the ages of twenty-five and forty-five. This is the time of life when the body is most subject to black bile, and the autumn is the corresponding season of the year. If a quartan fever occurs at any other time of the year, or at any other age, you may be sure that it will not be chronic unless some other malady be present.

A REGIMENT FOR HEALTH

An early recognition of the importance of preventive medicine

1. The ordinary man should adopt the following regimen. During the winter, he should eat as much as possible, drink as little as possible and this drink should be wine as undiluted as possible. Of cereals, he should eat bread, all his meat and fish should be roasted and he should eat as few vegetables as possible during winter-time. Such a diet will keep the body warm and dry.

When spring comes, he should take more to drink, increasing the quantity and making it more watery, a little at a time. He should take softer cereals and less of them, substituting barley-cake for bread. Meat should be cut down in the same way, boiled meat replacing roast, and a few vegetables should be eaten once spring has begun. Thus will he effect a gradual change and towards the summer he will be taking a diet consisting entirely of soft cereals, boiled meat and vegetables both raw and boiled. At that time he will be taking the greatest quantity of the most diluted wine, taking care that the change is neither violent nor sudden but that it is made gradually.

During the summer he should live on soft barley-cake, watered wine in large quantities and take all his meat boiled. Such a diet is necessary in summer to make the body cool and soft, for the season, being hot and dry, renders the body burnt-up and parched, and such a condition may be avoided by a suitable diet. The change from spring to summer should follow the same pattern as that from winter to spring, decreasing the amount of cereals and increasing the quantity of drink taken.

A reversal of this process constitutes the transition from the summer to the winter diet. In the autumn the cereals should be increased and made drier, and likewise the meat in the diet. The quantity of drink taken should be decreased and taken

less diluted so that he will have a good winter. Once more, then, he takes the smallest quantity of the least diluted drink and the largest quantity of cereals of the driest kind. This will keep him in good health and he will feel the cold less, for the season is cold and wet.

2. People with a fleshy, soft or ruddy appearance are best kept on a dry diet for the greater part of the year as they are constitutionally moist. Those with firm and tight-drawn skins, and those with tawny or dark complexions, should keep to a diet containing plenty of fluid most of the time, as the constitutions of such people are naturally dry. The softest and most moist diets suit young bodies best as at that age the body is dry and has set firm. Older people should take a drier diet most of the time, for at that age bodies are moist, soft and cold. Diets then must be conditioned by age, the time of year, habit, country and constitution. They should be opposite in character to the prevailing climate, whether winter or summer. Such is the best road to health.

3. In winter a man should walk quickly, in summer in more leisurely fashion unless he is walking in the hot sun. Fleshy people should walk faster, thin people more slowly. More baths should be taken in summer than in winter; firm people should bathe more than the fleshy ones. Garments in summer should be steeped in olive oil, but not in winter.

4. Fat people who want to reduce should take their exercise on an empty stomach and sit down to their food out of breath. They should not wait to recover their breath. They should before eating drink some diluted wine, not too cold, and their meat should be dished up with sesame seeds or seasoning and such-like things. The meat should also be fat as the smallest quantity of this is filling. They should take only one meal a day, go without baths, sleep on hard beds and walk about with as little clothing as may be. Thin people who want to get fat should do exactly the opposite and never take exercise on an empty stomach.

5. The following rules are to be observed in the administration of emetics and enemata. Vomiting may be induced during the six winter months, as this is the phlegmatic time of year

and diseases are centred about the head and in the chest. During the warm weather, enemata may be used as this is the hot season when the body is more bilious and heaviness occurs in the loins and knees, when there are fevers and colic in the belly. It is necessary therefore to cool the body and draw downwards the matter surrounding those regions. For those who are rather fat and moist, use the thinner and more briny enemata; for those who are drier and have firmer flesh, use the more fatty and thicker enemas, I mean those made from milk and from chick-pea and boiled water and such-like; by thin and briny, such things as brine and sea-water.

Emetics should be administered as follows. Those who are fat, but not those who are lean, should vomit on an empty stomach after a run or a brisk walk about the middle of the day. The emetic should consist of a gill of ground hyssop in six pints of water; this should be drunk after adding vinegar and salt to improve the taste. It should at first be drunk slowly, but the remainder more quickly. Thinner and weaker people should take emetics after food in the following way. A hot bath should be followed by drinking half a pint of neat wine after which a meal of any kind of food should be taken, but no drink is taken either with the meal or after it. Wait as long as it takes to walk a mile and then administer a mixture of three wines, a bitter, a sweet and an acid one, at first neat in small doses at long intervals and then more diluted in larger doses and more frequently.

Those who are accustomed to induce vomiting twice a month will find it better to do so on two consecutive days rather than every fortnight; as it is, most people do the opposite. Those who benefit from vomiting and those who have difficulty with passing stools should eat several times a day and take all varieties of food and their meat cooked in every different way and drink two or three kinds of wine. The opposite kind of diet is best for those who do not indulge in vomiting or for those with relaxed bellies.

6. Infants should be bathed for long periods in warm water and given their wine diluted and not at all cold. The wine

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should be of a kind which is least likely to cause distension of the stomach and wind. This should be done to prevent the occurrence of convulsions and to make the children grow and get good complexions. Women do best on a drier diet as dry foods are most suited to the softness of their flesh, and the less diluted drinks are better for the womb and for pregnancy.

7. Those who enjoy gymnastics should run and wrestle during the winter; in summer, wrestling should be restricted and running forbidden, but long walks in the cool part of the day should take their place. Those who get exhausted with running should wrestle, and those who get exhausted with wrestling should run. By exercising in this way, the exhausted parts of the body will best be warmed, composed and rested.

Those who find that exercise causes diarrhoea and who pass undigested stools resembling food, should have their exercise cut by at least a third while their food should be halved. For it is clear that the belly cannot get sufficiently warm to digest the greater part of the food. The diet in such cases should consist of bread baked as well as possible crumbled in wine, together with the smallest quantity of practically undiluted wine. They should not walk after meals. They should also take only one meal a day during the time they have diarrhoea; this will give the belly the best chance to deal with the food that is given it. This sort of diarrhoea is most common in those who are particularly stout, when, their constitution being what it is, they are obliged to eat meat. The vessels being compressed, they cannot cope with the intake of food. This type of constitution is nicely balanced, liable to fall off in either direction and it is at its best for only a short time.

The sparer and more hirsute type of person can better cope with a big diet and also with hard exercise. They remain at the height of their powers for a longer period.

Those who vomit their food the day after it has been taken and suffer from distension of the hypochondrium showing that the food remains undigested, should take more sleep and force their bodies by exercise. They should drink more wine and take it less diluted and also, at these times, reduce the amount of food. For it is clear that the weakness and coldness of the

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belly prevent the greater part of the food from being digested.

Those who suffer from thirst should reduce both the amount of food and the amount of exercise they take, and they should be given watery wine to drink as cold as possible.

Those who get pains in the viscera as the result of gymnastics or any other form of exercise should rest without eating and drink the smallest quantity necessary to cause the passing of the greatest amount of urine. In this way the vessels coursing through the viscera will not become filled and distended and so cause tumours and fevers.

9.* A wise man ought to realize that health is his most valuable possession and learn how to treat his illnesses by his own judgement.

*Chapter 8, which is an interpolation from another work, is omitted.

SURGERY

TRANSLATED BY E. T. WITHINGTON

FRACTURES

One of the great Hippocratic surgical treatises.

1. In dislocations and fractures, the practitioner should make extensions in as straight a line as possible, for this is most conformable with nature;* but if it inclines at all to either side, it should turn towards pronation [palm down] rather than supination [palm up], for the error is less. Indeed, those who have no preconceived idea make no mistake as a rule, for the patient himself holds out the arm for bandaging in the position impressed on it by conformity with nature. The theorizing practitioners are just the ones who go wrong. In fact the treatment of a fractured arm is not difficult, and is almost any practitioner's job, but I have to write a good deal about it because I know practitioners who have got credit for wisdom by putting up arms in positions which ought rather to have given them a name for ignorance. And many other parts of this art are judged thus: for they praise what seems outlandish before they know whether it is good, rather than the customary which they already know to be good; the bizarre rather than the obvious. One must mention then those errors of practitioners as to the nature of the arm on which I want to give positive and negative instruction, for this discourse is an instruction on other bones of the body also.

2. To come to our subject, a patient presented his arm to be dressed in the attitude of pronation, but the practitioner made him hold it as the archers do when they bring forward the shoulder, and he put it up in this posture, persuading himself that this was its natural position. He adduced as evidence the parallelism of the forearm bones, and the surface also, how that it has its outer and inner parts in a direct line, declaring

*Galen makes this a general statement; but the writer is apparently speaking of the forearm, which he had already mentioned in a lost introduction.

this to be the natural disposition of the flesh and tendons, and he brought in the art of the archer as evidence. This gave an appearance of wisdom to his discourse and practice, but he had forgotten the other arts and all those things which are executed by strength or artifice, not knowing that the natural position varies in one and another, and that in doing the same work it may be that the right arm has one natural position and the left another. For there is one natural position in throwing the javelin, another in using the sling, another in casting a stone, another in boxing, another in repose. How many arts might one find in which the natural position of the arms is not the same, but they assume postures in accordance with the apparatus each man uses and the work he wants to accomplish! As to the practiser of archery, he naturally finds the above posture strongest for one arm: for the hinge-like end of the humerus in this position being pressed into the cavity of the ulna makes a straight line of the bones of the upper arm and forearm, as if the whole were one, and the flexure of the joint is extended [abolished] in this attitude. Naturally then the part is thus most inflexible and tense, so as neither to be overcome or give way when the cord is drawn by the right hand. And thus he will make the longest pull, and shoot with the greatest force and frequency, for shafts launched in this way fly strongly, swiftly and far. But there is nothing in common between putting up fractures and archery. For, first, if the operator, after putting up an arm, kept it in this position, he would inflict much additional pain, greater than that of the injury, and again, if he bade him bend the elbow, neither bones, tendons, nor flesh would keep in the same position, but would rearrange themselves in spite of the dressings. Where, then, is the advantage of the archer position? And perhaps our theorizer would not have committed this error had he let the patient himself present the arm.

3. Again, another practitioner handing over the arm back downwards had it extended thus and then put it up in this position, supposing it to be the natural one from surface indications: presuming also that the bones are in their natural position because the prominent bone at the wrist on the little

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finger side appears to be in line with the bone from which men measure the forearm [cubit]. He adduced this as evidence for the naturalness of the position, and seemed to speak well.

But, to begin with, if the arm were kept extended in supination it would be very painful; anyone who held his arm extended in this position would find how painful it is. In fact, a weaker person grasping a stronger one firmly so as to get his elbow extended in supination might lead him whither he chose, for if he had a sword in this hand he would be unable to use it, so constrained is this attitude. Further, if one put up a patient's arm in this position and left him so, the pain, though greater when he walked about, would also be great when he was recumbent. Again, if he shall bend the arm, it is absolutely necessary for both the muscles and bones to have another position. Besides the harm done, the practitioner was ignorant of the following facts as to the position. The projecting bone at the wrist on the side of the little finger belongs indeed to the ulna, but that at the bend of the elbow from which men measure the cubit is the head of the humerus, whereas he thought the one and the other belonged to the same bone, and so do many besides. It is the so-called elbow on which we lean that belongs to this bone.* In a patient with the forearm thus supinated, first, the bone is obviously distorted, and secondly, the cords stretching from the wrist on its inner side and from the fingers also undergo distortion in this supine position, for these cords extend to the bone of the upper arm from which the cubit is measured. Such and so great are these errors and ignorances concerning the nature of the arm. But if one does extension of a fractured arm as I direct, he will both turn the bone stretching from the region of the little finger to the elbow so as to be straight† and will have the cords stretching from the wrist to the [lower] end of the humerus in a direct line; further, the arm when slung will keep about the same position as it was in when put up, and it will give the patient no pain when he walks, no pain when he lies down and no sense of weariness. The patient should be so seated that the projecting

*i.e. the olecranon process is part of the ulna.

†i.e. the styloid process in line with the olecranon.

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part of the bone is turned towards the brightest light available, that the operator may not overlook the proper degree of extension and straightening. Of course the hand of an experienced practitioner would not fail to recognize the prominence [at the fracture] by touch; also there is a special tenderness at the prominence when palpated.

4. When the bones of the forearm are not both fractured the cure is easier if the upper bone [radius] is injured, though it is the thicker, both because the sound bone lying underneath acts as a support and because it is better covered, except at the part near the wrist, for the fleshy growth on the upper bone is thick; but the lower bone [ulna] is fleshless, not well covered, and requires stronger extension. If it is not this bone but the other that is broken, rather slight extension suffices: if both are broken very strong extension is requisite. In the case of a child I have seen the bones extended more than was necessary, but most patients get less than the proper amount. During extension one should use the palms of the hands to press the parts into position, then after anointing with cerate (in no great quantity lest the dressings should slip), proceed to put it up in such a way that the patient shall have his hand not lower than the elbow but a little higher; so that the blood may not flow to the extremity but be kept back. Then apply the linen bandage, putting the head of it at the fracture so as to give support, but without much pressure. After two or three turns are made at the same spot, let the bandage be carried upwards that afflux of blood may be kept back, and let it end off there. The first bandages should not be lengthy. Put the head of the second bandage on the fracture, making one turn there; then let it be carried downwards, with decreasing pressure and at wider intervals, till enough of the bandage is left for it to run back again to the place where the other ended. Let the bandages in this part of the dressing be applied either to left or right, whichever suits the form of the fracture and the direction towards which the limb ought to turn. After this, compresses should be laid along after being anointed with a little cerate; for the application is more supple and more easily made. Then put on bandages crosswise to right and

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left alternately, beginning in most cases from below upwards but sometimes from above downwards. Treat conical parts by surrounding them with compresses, bringing them to a level not all at once but gradually by the number of circumvolutions. You should put additional loose turns now and then at the wrist. The two sets of bandages are a sufficient number for the first dressing.

5. These are the indications of good treatment and correct bandaging: If you ask the patient whether the part is compressed and he says it is, but moderately and that chiefly at the fracture. A properly bandaged patient should give a similar report of the operation throughout. The following are the indications of a due moderation. During the day of the dressing and the following night the pressure should appear to the patient not to diminish but rather to increase, and on the following day a slight and soft swelling should appear in the hand; you should take this as a sign of the due mean as to pressure. At the end of the day the pressure should seem less, and on the third day you should find the bandages loose. If, then, any of the said conditions are lacking you may conclude that the bandaging was slacker than the mean, but if any of them be excessive you may conclude that the pressure was greater than the mean, and taking this as a guide make the next dressing looser or tighter. You should remove the dressing on the third day after the extension and adjustment, and if your first bandaging hit the proper mean this one should be a little tighter. The heads of the bandages should be applied over the fracture as before, for if you did this before, the serous effusions were driven thence into the outer parts on both sides, but if you formerly made the pressure anywhere else, they were driven into this place [the fracture] from the part compressed. It is useful for many things to understand this. It shows that one should always begin the bandaging and compression at this point, and, for the rest, in proportion as you get further from the point of fracture make the pressure less. Never make the turns altogether slack, but closely adherent. Further, one should use more bandages at each dressing, and the patient when asked should say he felt a little more pressure

than before, especially at the point of fracture, and the rest in proportion. And as regards the swelling, feeling of pain and relief, things should be in accord with the previous dressing. When the third day comes, he should find the dressings rather loose. Then after undoing them he should bandage again with a little more pressure and with all the bandages that he is going to use, and afterwards the patient should experience all those symptoms which he had in the first periods of bandaging.

6. When the third day is reached (the seventh from the first dressing), if he is being properly bandaged, there will be the swelling on the hand, but it will not be very marked. As to the part bandaged, it will be found to be thinner and more shrunken at each dressing, and on the seventh day it will be quite thin, while the fractured bones will be more mobile and ready for adjustment. If this is so, after seeing to the adjustment you should bandage as for splints, making a little more pressure than before, unless there is any increase of pain from the swelling on the hand. When you dress with the bandages you should apply the splints round the limb and include them in ligatures as loose as possible consistently with firmness, so that the addition of the splints may contribute nothing to the compression of the arm. After this the pain and the relief following it should be the same as in the previous periods of bandaging. When, on the third day, he says it is loose, then indeed you should tighten up the splints, especially at the fracture, and the rest in proportion where the dressing also was loose rather than tight. The splint should be thicker where the fracture projects, but not much so, and you should take special care that it does not lie in the line of the thumb, but on one side or the other, nor in the line of the little finger where the bone projects at the wrist, but on one side or the other. If, indeed, it is for the benefit of the fracture that some of the splints should be placed thus, you should make them shorter than the rest, so that they do not reach as far as the bones which project at the wrist, for there is risk of ulceration and denuding of tendons. You should tighten the splints every third day very slightly, bearing in mind that they are put there

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to maintain the dressing, but not bound in for the sake of pressure.

7. If you are convinced that the bones are sufficiently adjusted in the former dressings, and there is no painful irritation nor any suspicion of a sore, you should leave the part put up in splints till over the twentieth day. It takes about thirty days altogether as a rule for the bone of the forearm to unite. But there is nothing exact about it, for both constitutions and ages differ greatly. When you remove the dressing, douche with warm water and replace it, using a little less pressure and fewer bandages than before; and after this, remove and re-apply every other day with less pressure and fewer bandages. If, in any case where splints are used, you suspect that the bones are not properly adjusted, or that something else is troubling the patient, remove the dressing and replace it in the middle of the interval or a little sooner. Light diet suffices in those cases where there is no open wound at the first, or protrusion of the bone, for it should be slightly restricted for the first ten days, seeing that the patients are resting; and soft foods should be taken such as favour a due amount of evacuation. Avoid wine and meat, but afterwards gradually feed him up. This discourse gives a sort of normal rule for the treatment of fractures, how one should handle them surgically, and the results of correct handling. If any of the results are not as described, you may be sure there has been some defect or excess in the surgical treatment. You should acquaint yourself further with the following points in this simple method, points with which practitioners do not trouble themselves very much, though they are such as (if not properly seen to) can bring to naught all your carefulness in bandaging. If both bones are broken, or the lower [ulna] only, and the patient, after bandaging, has his arm slung in a sort of scarf, this scarf being chiefly at the point of fracture, while the arm on either side is unsupported, he will necessarily be found to have the bone distorted towards the upper side; while if, when the bones are thus broken, he has the hand and part near the elbow in the scarf, while the rest of the arm is unsupported, this patient will be

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found to have the bone distorted towards the lower side. It follows that as much as possible of the arm and wrist should be supported evenly in a soft broad scarf.

8. When the humerus is fractured, if one extends the whole arm and keeps it in this posture, the muscle of the arm* will be bandaged in a state of extension, but when the bandaged patient bends his arm the muscle will assume another posture. It follows that the most correct mode of extension of the arm is this: One should hang up a rod, in shape like a spade handle and of a cubit in length or rather shorter, by a cord at each end. Seat the patient on a high stool and pass his arm over the rod so that it comes evenly under the armpit in such a position that the man can hardly sit and is almost suspended. Then placing another stool, put one or more leather cushions under the forearm as may suit its elevation when flexed at a right angle. The best plan is to pass some broad soft leather or a broad scarf round the arm and suspend from it heavy weights sufficient for due extension; failing this, let a strong man grasp the arm in this position at the elbow and force it downwards. As to the surgeon, he should operate standing with one foot on some elevated support, adjusting the bone with the palms of his hands. The adjustment will be easy, for there is good extension if it is properly managed. Then let him do the bandaging, putting the heads of the bandages on the fracture and performing all the rest of the operation as previously directed. Let him ask the same questions, and use the same indications to judge whether things are right or not. He should bandage every third day and use greater pressure, and on the seventh or ninth day put it up in splints. If he suspects the bone is not in good position, let him loosen the dressings towards the middle of this period† and after putting it right re-apply them.

The bone of the upper arm usually consolidates in forty days. When these are passed one should undo the dressings and diminish the pressure and the number of bandages. A somewhat stricter diet and more prolonged [is required here]

* Biceps.

† i.e. the period in splints.

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than in the former case. Make your estimate from the swelling in the hand, having an eye to the patient's strength. One must also bear in mind that the humerus is naturally convex outwards, and is therefore apt to get distorted in this direction when improperly treated. In fact, all bones when fractured tend to become distorted during the cure towards the side to which they are naturally bent. So, if you suspect anything of this kind, you should pass round it an additional broad band, binding it to the chest, and when the patient goes to bed, put a many-folded compress, or something of the kind, between the elbow and the ribs, thus the curvature of the bone will be rectified. You must take care, however, that it is not bent too much inwards.

9. The human foot, like the hand, is composed of many small bones. These bones are not often broken, unless the tissues are also wounded by something sharp or heavy. The proper treatment of the wounded parts will be discussed in the section on lesions of soft parts.* But if any of the bones be displaced, whether a joint of the toes or some bone of what is called the tarsus, you should press each back into its proper place just in the way described as regards the bones of the hand.† Treat as in cases of fracture with cerate, compresses and bandages, but without splints, using pressure in the same way and changing the dressings every other day. The patient's answers both as to pressure and relaxation should be similar to those in cases of fracture. All these bones are completely healed in twenty days, except those which are connected with the leg-bones in a vertical line. It is good to lie up during this period, but patients, despising the injury, do not bring themselves to this, but go about before they are well. This is the reason why most of them do not make a complete recovery, and the pain often returns; naturally so, for the feet carry the whole weight. It follows that when they walk about before they are well, the displaced joints heal up badly; on which account they have occasional pains in the parts near the leg.

10. [Displacement of the astragalus?] The bones which are

* Rather 'compound fractures', cf. chs. 24f.

† A lost chapter, condensed in *Joints*, ch. 26.

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in connection with those of the leg are larger than the others,* and when they are displaced healing takes much longer. Treatment, indeed, is the same, but more bandages and pads should be used, also extend the dressings completely in both directions. Use pressure, as in all cases so here especially, at the point of displacement, and make the first turns of the bandage there. At each change of dressing use plenty of warm water; indeed, douche copiously with warm water in all injuries of joints. There should be the same signs as to pressure and slackness in the same periods as in the former cases, and the change of dressings should be made in the same way. These patients recover completely in about forty days, if they bring themselves to lie up; failing this, they suffer the same as the former cases, and to a greater degree.

11. Those who, in leaping from a height, come down violently on the heel, get the bones separated, while there is extravasation from the blood-vessels since the flesh is contused about the bone. Swelling supervenes and severe pain, for this bone is not small, it extends beyond the line of the leg, and is connected with important vessels and cords. The back tendon† is inserted into this bone. You should treat these patients with cerate, pads and bandages, using an abundance of hot water, and they require plenty of bandages, the best and softest you can get. If the skin about the heel is naturally smooth, leave it alone, but if thick and hard as it is in some persons, you should pare it evenly and thin it down without going through to the flesh. It is not every man's job to bandage such cases properly, for if one applies the bandage, as is done in other lesions at the ankle, taking one turn round the foot and the next round the back tendon, the bandage compresses the part and excludes the heel where the contusion is, so that there is risk of necrosis of the heel-bone; and if there is necrosis the malady may last the patient's whole life. In fact, necrosis from other causes, as when the heel blackens while the patient is in bed owing to carelessness as to its position, or when there is a serious and chronic wound in the leg connected with the heel, or in the thigh, or another malady involving prolonged rest

*Those of the wrist.

†*Tendo Achillis.*

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on his back – all these necroses are equally chronic and troublesome, and often break out afresh if not treated with most skilful attention and long rest. Necroses of this sort, indeed, besides other harm, bring great dangers to the body, for there may be very acute fevers, continuous and attended by tremblings, hiccoughs and affections of the mind, fatal in a few days. There may be also be lividity and congestion of the large blood-vessels, loss of sensation and gangrene due to compression, and these may occur without necrosis of the bone. The above remarks apply to very severe contusions, but the parts are often moderately contused and require no very great care, though, all the same, they must be treated properly. When, however, the crushing seems violent the above directions should be observed, the greater part of the bandaging being about the heel, taking turns sometimes round the end of the foot, sometimes about the middle part, and sometimes carrying it up the leg. All the neighbouring parts in both directions should be included in the bandage, as explained above; and do not make strong pressure, but use many bandages. It is also good to give a dose of hellebore on the first and second days. Remove the bandage and re-apply it on the third day. The following are signs of the presence and absence of aggravations. When there are extravasations from the blood-vessels, and blackenings, and the neighbouring parts become reddish and rather hard, there is danger of aggravation. Still, if there is no fever you should give an emetic as was directed; also in cases where the fever is not continuous; but if there is continued fever, do not give an evacuant, but avoid food, solid or fluid, and for drink use water and not wine, but hydro-mel may be taken. If there is not going to be aggravation, the effusions and blackenings and the parts around become yellowish and not hard. This is good evidence in all extravasations that they are not going to get worse, but in those which turn livid and hard there is danger of gangrene. One must see that the foot is, as a rule, a little higher than the rest of the body. The patient will recover in sixty days if he keeps at rest.

12. The leg has two bones, one much more slender than the other at one end, but not so much at the other end. The parts

near the foot are joined together and have a common epiphysis. In the length of the leg they are not united, but the parts near the thigh bone are united and have an epiphysis, and the epiphysis has a diaphysis.* The bone on the side of the little toe is slightly the longer. This is the disposition of the leg-bones.

13. The bones are occasionally dislocated at the foot end, sometimes both bones with the epiphysis, sometimes the epiphysis is displaced, sometimes one of the bones. These dislocations give less trouble than those of the wrist, if the patients can bring themselves to lie up. The treatment is similar to that of the latter, for reduction is to be made by extension as in those cases, but stronger extension is requisite since the body is stronger in this part. As a rule two men suffice, one pulling one way and one the other, but if they cannot do it, it is easy to make the extension more powerful. Thus, one should fix a wheel-nave or something similar in the ground, put a soft wrapping round the foot, and then binding broad straps of ox-hide about it attach the ends of the straps to a pestle or some other rod. Put the end of the rod into the wheel-nave and pull back, while assistants hold the patient on the upper side grasping both at the shoulders and hollow of the knee. The upper part of the body can also be fixed by an apparatus. First, then, you may fix a smooth, round rod deeply in the ground with its upper part projecting between the legs at the fork, so as to prevent the body from giving way when they make extension at the foot. Also it should not incline towards the leg which is being extended, but an assistant seated at the side should press back the hip so that the body is not drawn sideways. Again, if you like, the pegs may be fixed at either armpit, and the arms kept extended along the sides. Let someone also take hold at the knee, and so counter-extension may be made. Again, if one thinks fit, one may likewise fasten straps about the knee and thigh, and fixing another wheel-nave in the ground above the head, attach the straps to a rod; use the nave as a fulcrum for the rod and make extension counter to that at the feet. Further, if you like, instead of the

* Spinous process or medial projection.

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wheel-naves, stretch a plank of suitable length under the bed, then, using the head of the plank at each end as fulcrum, draw back the rods and make extension on the straps. And if you choose, set up windlasses at either end and make the extension by them. There are also many other methods for extensions. The best thing for anyone who practises in a large city is to get a wooden apparatus comprising all the mechanical methods for all fractures and for reduction of all joints by extension and leverage. This wooden apparatus will suffice if it be like the quadrangular supports such as are made of oak in length, breadth and thickness.

When you make sufficient extension it is then easy to reduce the joint for it is elevated in a direct line above its old position. It should therefore be adjusted with the palms of the hands, pressing upon the projecting part with one palm and with the other making counter pressure below the ankle on the opposite side.

14. After reduction, you should if possible apply a bandage, while the limb is kept extended. If the straps get in the way, remove them and keep up counter extension while bandaging. Bandage in the same way [as for fractures] putting the heads of the bandages on the projecting part and making the first and most turns there, also most of the compresses should be there and the pressure should come especially on this part. Also extend the dressing considerably to either side. This joint requires somewhat greater pressure at the first bandaging than does the wrist. After dressing let the bandaged part be higher than the rest of the body, and put it up in a position in which the foot is as little as possible unsupported.* The patient should undergo a reducing process corresponding to his strength and to the displacement, for the displacement may be small or great. As a rule the reducing treatment should be stricter and more prolonged in injuries about the leg region than in those about the arm region, for the former parts are larger and stouter than the latter. And it is especially needful for the body to be at rest and lie up. As to rebandaging the

* Not merely prevented from hanging down, but kept at right angles to the leg.

joint on the third day, there is neither hindrance nor urgency, and one should conduct all the other treatment as in the previous cases. If the patient brings himself to keep at rest and lie up, forty days are sufficient, provided only that the bones are back again in their places. If he will not keep at rest, he will not easily recover the use of the leg and will have to use bandages for a long time. Whenever the bones are not completely replaced but there is something wanting, the hip, thigh and leg gradually become atrophied. If the dislocation is inwards the outer part is atrophied, if outwards, the inner: now most dislocations are inwards.*

15. When both leg-bones are broken without an external wound, stronger extension is required. If there is much overlapping make extension by some of those methods which have been described. But extensions made by man-power are also sufficient, for in most cases two strong men are enough, one pulling at each end. The traction should be in a straight line in accordance with the natural direction of the leg and thigh, both when it is being made for fractures of the leg bones and of the thigh. Apply the bandage while both† are extended, whichever of the two you are dressing, for the same treatment does not suit both leg and arm. For when fractures of the forearm and upper arm are bandaged, the arm is slung, and if you bandage it when extended the positions of the fleshy parts are altered by bending the elbow. Further, the elbow cannot be kept extended a long time, since it is not used to that posture, but to that of flexion. And besides, since patients are able to go about after injuries of the arm, they want it flexed at the elbow. But the leg both in walking and standing is accustomed to be sometimes extended and sometimes nearly so, and it is naturally directed downwards and, what is more, its function is to support the body. Extension therefore is easily borne when necessary and indeed it frequently has this position in bed. If then it is injured, necessity brings the mind into subjection, because patients are unable to rise, so that they do not even think of bending their legs and getting up, but keep lying at

*i.e. of the foot outwards and the leg inwards.

†i.e. thigh and leg.

rest in this posture. For these reasons, then, the same position either in making extension or bandaging is unsuitable for both arm and leg. If, then, extension by man-power is enough, one should not take useless trouble, for to have recourse to machines when not required is rather absurd. But if extension by man-power is not enough, bring in some of the mechanical aids, whichever may be useful. When once sufficient extension is made, it becomes fairly easy to adjust the bones to their natural position by straightening them and making coaptation with the palms of the hands.

16. After adjustment, apply the bandages while the limb is extended, making the turns with the first bandage, either to right or left as may be suitable. Put the head of the bandage at the fracture and make the first turns there, and then carry the bandaging to the upper part of the leg as was directed for the other fractures. The bandages should be broader and longer and much more numerous for the leg parts than those of the arm. On completing the dressing, put up the limb on something smooth and soft so that it does not get distorted to either side or become concave or convex. The most suitable thing to put under is a pillow of linen or wool, not hard, making a median longitudinal depression in it, or something that resembles this.

As for the hollow splints which are put under fractured legs I am at a loss what to advise as regards their use. For the good they do is not so great as those who use them suppose. The hollow splints do not compel immobility as they think, for neither does the hollow splint forcibly prevent the limb from following the body when turned to either side, unless the patient himself sees to it, nor does it hinder the leg itself apart from the body from moving this way or that. Besides, it is, of course, rather unpleasant to have wood under the limb unless at the same time one inserts something soft. But it is very useful in changing the bedclothes, and in getting up to go to stool. It is thus possible either with or without the hollow splint to arrange the matter well or clumsily. Still the vulgar have greater faith in it, and the practitioner will be more free from blame if a hollow splint is applied, though it is rather bad

practice. Anyhow, the limb should be on something smooth and soft and be absolutely straight, since it necessarily follows that the bandaging is overcome by any deviation in posture, whatever the direction or extent of it may be. The patient should give the same answers as those above mentioned, for the bandaging should be similar, and there should be the like swelling on the extremities, and so with the looseness and the changes of dressing every third day. So, too, the bandaged part should be found more slender and greater pressure be used in the dressings and more bandages. You should also make some slack turns round the foot if the injury is not very near the knee. One should make moderate extension and adjustment of the bones at each dressing; for if the treatment be correct and the oedema subsides regularly, the bandaged part will be more slender and attenuated while the bones on their side will be more mobile and lend themselves more readily to extension. On the seventh, ninth, or eleventh day splints should be applied as was directed in the case of other fractures, and one must be careful as to the position of the splints, both in the line of the ankles, and about the back tendon from leg to foot. The bones of the leg solidify in forty days if properly treated. If you suspect that one of the bones requires some adjustment, or are afraid of ulceration, you should unbandage the part in the interval and reapply after putting it right.

17. If one of the leg-bones be broken, the extension required is weaker: there should, however, be no shortcoming or feebleness about it. Especially at the first dressing sufficient extension should be made in all fractures so as to bring the bones together, or, failing this, as soon as possible, for when one in bandaging uses pressure, if the bones have not been properly set, the part becomes more painful. The rest of the treatment is the same.

18. Of the bones, the inner of the so-called shin is the more troublesome to treat, requiring greater extension, and if the fragments are not properly set, it cannot be hid, for it is visible and entirely without flesh. When this bone is broken, patients take longer before they can use the leg, while if the

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outer bone be fractured they have much less inconvenience to bear, and, even if not well set, it is much more readily concealed; for it is well covered: and they can soon stand. For the inner shin-bone carries the greatest part of the weight, since both by the disposition of the leg itself and by the direct line of the weight upon the leg the inner bone has most of the work. Further, the head of the thigh-bone sustains the body from below and has its natural direction towards the inner side of the leg and not the outer, but is in the line of the shin bone. So, too, the corresponding half of the body is nearer the line of this bone than that of the outer one, and besides, the inner is thicker than the outer, just as in the forearm the bone on the side of the little finger is longer and more slender; but in this lower articulation the longer bone does not lie underneath in the same way, for flexion at the elbow and knee are dissimilar. For these reasons, when the outer bone is fractured patients soon get about; but when the inner one is broken they do so slowly.

19. If the thigh-bone is fractured, it is most important that there should be no deficiency in the extension that is made, while any excess will do no harm. In fact, even if one should bandage while the bones were separated by the force of the extension, the dressing would have no power to keep them apart, but they would come together immediately when the assistants relaxed their tension. For the fleshy part being thick and powerful will prevail over the bandaging, and not be overcome by it. To come to our subject, one should extend very strongly and without deviation leaving no deficiency, for the disgrace and harm are great if the result is a shortened thigh. The arm, indeed, when shortened may be concealed and the fault is not great, but the leg when shortened will leave the patient lame, and the sound leg being longer [by comparison] exposes the defect; so that if a patient is going to have unskilful treatment, it is better that both his legs should be broken than one of them, for then at least he will be in equilibrium. When, therefore, you have made sufficient extension, you should adjust the parts with the palms of the hands and bandage in the same way as was described before, placing the head of the bandage as

directed and carrying it upwards. And he should give the same answers as before, and experience the same trouble and relief. Let the change of dressing be made in the same way, and the same application of splints. The thigh-bone gets firm in forty days.

20. One should also bear the following in mind, that the thigh-bone is curved outwards rather than inwards, and to the front rather than to the back, so it gets distorted in these directions if not skilfully treated. Furthermore it is less covered with flesh on these parts so that distortions cannot be hidden. If, then, you suspect anything of this kind, you should have recourse to the mechanical methods recommended for distortion of the upper arm. Some additional turns of bandage should be made round the hip and loins so that the groins and the joint at the so-called fork may be included, for besides other benefits, it prevents the ends of the splints from doing damage by contact with the uncovered parts. The splints should always come considerably short of the bare part at either end, and care should always be taken as to their position so that it is neither on the bone where there are natural projections about the joint, nor on the tendon.

21. As to the swellings which arise owing to pressure behind the knee or at the foot or elsewhere, dress them with plenty of crude wool, well pulled out, sprinkling it with oil and wine, after anointing with cerate, and if the splints cause pressure relax them at once. You will reduce the swellings by applying slender bandages after removing the splints, beginning from the lowest part and passing upwards, for so the swelling would be most rapidly reduced and flow back above the original dressing. But you should not use this method of bandaging unless there is danger of blisters forming or mortification at the swelling. Now, nothing of this kind happens unless one puts great pressure on the fracture, or the part is kept hanging down or is scratched with the hand, or some other irritant affects the skin.

22. As to a hollow splint, if one should pass it under the thigh itself and it does not go below the bend of the knee it would do more harm than good; for it would prevent neither

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the body nor the leg from moving apart from the thigh, would cause discomfort by pressing against the flexure of the knee, and incite the patient to bend the knee, which is the last thing he should do. For when the thigh and leg are bandaged, he who bends the knee causes all sorts of disturbance to the dressings, since the muscles will necessarily change their relative positions and there will also necessarily be movement of the fractured bones. Special care, then, should be taken to keep the knee extended. I should think that a hollow splint reaching [evenly?] from hip to foot would be useful, especially with a band passed loosely round at the knee to include the splint, as babies are swaddled in their cots. Then if the thigh-bone is distorted upwards [i.e. forwards] or sideways it will thus be more easily controlled by the hollow splint. You should, then, use the hollow splint for the whole limb or not at all.

23. In fractures both of the leg and of the thigh great care should be taken that the point of the heel is in good position. For if the foot is in the air while the leg is supported, the bones at the shin necessarily present a convexity, while if the foot is propped up higher than it should be, and the leg imperfectly supported, this bone in the shin part has a more hollow appearance than the normal, especially if the heel happens to be large compared with the average in man. So, too, all bones solidify more slowly if not placed in their natural position and kept at rest in the same posture, and the callus is weaker.

24. The above remarks apply to those whose bones are fractured without protrusion or wound of other kind. In fractures with protrusion, where they are single and not splintered, if reduced on the same or following day, the bones keeping in place, and if there is no reason to expect elimination of splinters, or even cases in which, though there is an external wound, the broken bones do not stick out, nor is the nature of the fracture such that any splinters are likely to come to the surface: in such cases they do neither much good nor much harm who treat the wound with a cleansing plaster, either pitch cerate, or an application for fresh wounds, or whatever

else they commonly use, and bind over it compresses soaked in wine, or uncleansed wool or something of the kind. And after the wounds are cleansed and already united, they attempt to make adjustment with splints and use a number of bandages. This treatment does some good and no great harm. The bones, however, cannot be so well settled in their proper place, but become somewhat unduly swollen at the point of fracture. If both bones are broken, either of forearm or leg, there will also be shortening.

25. Then there are others who treat such cases at once with bandages, applying them on either side, while they leave a vacancy at the wound itself and let it be exposed. Afterwards, they put one of the cleansing applications on the wound, and treat it with pads steeped in wine, or with crude wool. This treatment is bad, and those who use it probably show the greatest folly in their treatment of other fractures as well as these. For the most important thing is to know the proper way of applying the head of the bandage, and how the chief pressure should be made, also what are the benefits of proper application and of getting the chief pressure in the proper place, and what is the harm of not placing the bandage rightly, and of not making pressure where it should chiefly be, but at one side or the other. Now the results of each were explained in what has been written above. The treatment, too, is itself evidence; for in a patient so bandaged the swelling necessarily arises in the wound itself, since if even healthy tissue were bandaged on this side and that, and a vacancy left in the middle, it would be especially at the vacant part that swelling and decoloration would occur. How then could a wound fail to be affected in this way? For it necessarily follows that the wound is discoloured with everted edges, and has a watery discharge devoid of pus,* and as to the bones, even those which were not going to come away do come away. The wound will become heated and throbbing, and they are obliged to put on an additional plaster because of the swelling; and this too will be harmful to patients bandaged at either side of the wound, for an unprofitable burden is added to the throbbing.

* That is, an unhealthy discharge without 'purification'.

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They finally take off the dressings, when they find there is aggravation, and treat it for the future without bandaging. Yet none the less, if they get another wound of the same sort, they use the same treatment, for they do not suppose that the outside bandaging and exposure* of the wound is to blame, but some mishap. However, I should not have written so much about this had I not known well the harmfulness of this dressing and that many use it; and that it is of vital importance to unlearn the habit. Besides, it is an evidence of the truth of what was written before on the question whether the greatest or least pressure should come at the fracture.†

26. [Proper treatment of compound fractures.] To speak summarily, when there is no likelihood of elimination of bone, one should use the same treatment as in cases of fracture without external wound. The extensions and adjustments of the bones should be made in the same way, and so too with the bandaging. After anointing the wound itself with pitch cerate, bind a thin doubled compress over it, and anoint the surrounding parts with a thin layer of cerate. The bandages and other dressings should be torn in rather broader strips than if there was no wound, and the one first used should be a good deal wider than the wound; for bandages narrower than the wound bind it like a girdle, which should be avoided; rather let the first turn take in the whole wound, and let the bandage extend beyond it on both sides. One should, then, put the bandage just in the line of the wound, make rather less pressure than in cases without a wound, and distribute the dressing as directed above. The bandages should always be of the pliant kind, and more so in these cases than if there was no wound. As to number, let it not be less than those mentioned before, but even a little greater. When the bandaging is finished it should appear to the patient to be firm without pressure, and

* Exposure here cannot mean exposure to cold or even bareness – the foolish surgeons cover the wound with wool or pads – it means absence of due pressure, the proper graduation of which is the main point in Hippocratic bandaging.

† According to Adams, who translated Hippocrates in 1849, this warning was still necessary in his time.

he should say that the greatest firmness is over the wound. There should be the same periods of a sensation of greater firmness, and greater relaxation, as were described in the former cases. Change the dressings every other day, making the changes in similar fashion except that, on the whole, the pressure should be less in these cases. If the case takes a natural course according to rule, the part about the wound will be found progressively diminished and all the rest of the limb included in the bandage will be slender. Purification* will take place more rapidly than in wounds treated otherwise, and all fragments of blackened or dead tissue are more rapidly separated and fall off under this treatment than with other methods. The wound, too, advances more quickly to cicatrization thus than when treated otherwise. The cause of all this is that the wound and the surrounding parts become free from swelling. In all other respects, then, one should treat these cases like fractures without a wound, but splints should not be used.† This is why the bandages should be more numerous than in the other cases both because there is less pressure and because the splints are applied later. But if you do apply splints, do not put them in the line of the wound; especially apply them loosely, taking care that there is no great compression from the splints. This direction was also given above. Diet, however, should be more strict and kept up longer in cases where there is a wound from the first and where the bones protrude, and on the whole, the greater the injury the more strict and prolonged should be the dieting.

27. The same treatment of the wounds applies also to cases of fracture which are at first without wound, but where one occurs during treatment either through too great compression by bandages or the pressure of a splint or some other cause. In such cases the occurrence of ulceration is recognized by pain and throbbing: also the swelling on the extremities gets harder, and if you apply the finger the redness is removed but quickly returns. So, if you suspect anything of this kind you should undo the dressings, if there is irritation below the

*i.e. discharge of laudable pus.

†We must evidently understand 'so soon'.

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under bandages, or in the rest of the bandaged part, and use pitch cerate instead of the other plaster. Should there be none of this, but the sore itself is found to be irritated, extensively blackened or foul with tissues about to suppurate and tendons on the way to be thrown off, it is by no means necessary to leave them exposed, or to be in any way alarmed at these suppurations, but treat them for the future in the same manner as cases in which there is a wound from the first. The bandaging should begin from the swelling at the extremities and be quite slack; then it should be carried right on upwards, avoiding pressure in any place, but giving special support at the wound and decreasing it elsewhere. The first bandages must be clean and not narrow, their number as many as when splints are applied or a little fewer. On the wound itself a compress anointed with white cerate is sufficient; for if flesh or tendon be blackened it will also come away. One should treat such cases not with irritant, but with mild applications, just like burns. Change the dressing every other day but do not apply splints. Keep the patient at rest and on low diet even more than in the former case. One should know if either flesh or tendon is going to come away that the loss will be much less extensive and will be brought about much quicker, and the surrounding parts will be much less swollen [by this treatment], than if on removing the bandage one applied some detergative plaster to the wound. Besides, when the part that is going to suppurate off does come away, flesh formation and cicatrization will be more rapid with the former treatment than with any other. The whole point is to know the correct method and due measure in dressing these cases. Correctness of position also contributes to the result, as well as diet and the suitability of the bandages.

28. If, perchance, you are deceived in fresh cases, and think there will be no elimination of bones, yet they show signs of coming to the surface, the use of the above mode of treatment need not cause alarm, for no great damage will be done if only you have sufficient manual skill to apply the dressings well and in a way that will do no harm. The following is a sign of approaching elimination of bone in a case thus treated. A

large amount of pus flows from the wound, which appears turgid. So the dressing should be changed more often because of the soaking,* for thus especially they get free from fever, if there is no great compression by the bandages, and the wound and surrounding parts are not engorged. But separations of very small fragments require no great alteration of treatment beyond either loose bandaging so as not to intercept the pus but allow it to flow away freely; or even more frequent change of dressing till the bone separates, and no application of splints.

29. But in cases where separation of a rather large bone is probable, whether you prognosticate it from the first or recognize it later, the treatment should not be the same, but, while the extensions and adjustments should be done as was directed, the compresses should be double, half a span in breadth at least – take the nature of the wound as standard for this – and in length a little less than will go twice round the wounded part, but a good deal more than will go once round. Provide as many of these as may suffice, and after soaking them in dark astringent wine, apply them beginning from their middle as is done with a two-headed under-bandage; enveloping the part and then leaving the ends crossed obliquely, as with the adze-shaped bandage. Put them both over the wound itself and on either side of it, and though there should be no compression, they should be applied firmly so as to support the wound. On the wound itself one should put pitch cerate or one of the applications for fresh injuries or any other appropriate remedy which will serve as an embrocation. If it is summer time soak the compresses frequently with wine, but if winter apply plenty of crude wool moistened with wine and oil. A goat's skin should be spread underneath to make free course for discharges, giving heed to drainage and bearing in mind that these regions (when patients lie a long time in the same posture) develop sores difficult to heal.

30. As to cases which cannot be treated by bandaging in one of the ways which have been or will be described, all the more care should be taken that they shall have the fractured

*'Maceration', 'abundance of humours'.

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limb in good position in accord with its normal lines, seeing to it that the slope is upwards rather than downwards. If one intends to do the work well and skilfully, it is worth while to have recourse to mechanism, that the fractured part may have proper but not violent extension. It is especially convenient to use mechanical treatment for the leg. Now, there are some who in all cases of leg fractures, whether they are bandaged or not, fasten the foot to the bed, or to some post which they fix in the ground by the bed. They do all sorts of harm and no good; for extension is not ensured by fastening the foot, since the rest of the body will none the less move towards the foot, and thus extension will not be kept up. Nor is it of any use for preserving the normal line, but even harmful. For when the rest of the body is turned this way or that, the ligature in no way prevents the foot and the bones connected with it from following the movement: if it were not tied up, there would be less distortion, for it would not be left behind so much in the movement of the rest of the body. Instead of this, one should get two rounded circlets sewn in Egyptian leather such as are worn by those who are kept a long time shackled in the large fetters. The circlets should have coverings on both sides deeper on the side facing the injury and shallower on that facing the joints. They should be large and soft, fitting the one above the ankle, the other below the knee. They should have on each side two attachments of leather thongs, single or double, short like loops, one set at the ankle on either side, the other on either side of the knee (and the upper circlet should have others like them in the same straight line, i.e. just opposite those below). Then take four rods of cornel wood of equal size, the thickness of a finger; and of such length as when bent they fit into the appendices, taking care that the ends of the rods do not press upon the skin but on the projecting edges of the circlet. There should be three or more pairs of rods, some longer than the others and some shorter and more slender, so as to exert greater or less tension at pleasure. Let the rods be placed separately on either side of the ankles. This mechanism if well arranged will make the extension both correct and even in accordance with the normal lines, and cause

no pain in the wound, for the outward pressure, if there is any, will be diverted partly to the foot and partly to the thigh. The rods are better placed, some on one side and some on the other side of the ankles, so as not to interfere with the position of the leg; and the wound is both easy to examine and easy to handle. For, if one pleases, there is nothing to prevent the two upper rods from being tied together, so that, if one wants to put something lightly over it, the covering is kept up away from the wound. If then the circlets are supple, of good quality, soft and newly sewn, and the extension by the bent rods suitably regulated as just described, the mechanism is of good use, but if any of these things are not well arranged it will harm rather than help. Other mechanisms also should either be well arranged or not used, for it is shameful and contrary to the art to make a machine and get no mechanical effect.

31. Again, most practitioners treat fractures, whether with or without wounds, by applying uncleansed wool during the first days, and this appears in no way contrary to the art. Those who because they have no bandages are obliged to get wool for first-aid treatment are altogether excusable, for in the absence of bandages one would have nothing much better than wool with which to dress such cases; but it should be plentiful, well pulled out and not lumpy; if small in amount and of poor quality its value is also small. Now, those who think it correct to dress with wool for one or two days, and on the third or fourth day use bandages with compression and extension just at this period are very ignorant of the healing art, and that on a most vital point. For, to speak summarily, the third or fourth day is the very last on which any lesion should be actively interfered with; and all probings as well as everything else by which wounds are irritated should be avoided on these days. For, as a rule, the third or fourth day sees the birth of exacerbations in the majority of lesions, both where the tendency is to inflammation and foulness, and in those which turn to fever. And if any instruction is of value this is very much so. For what is there of most vital importance in the healing art to which it does not apply, not only as regards wounds but

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many other maladies? Unless one calls all maladies wounds, for this doctrine also has reasonableness, since they have affinity one to another in many ways. But those who think it correct to use wool till seven days are completed and then proceed to extension, coaptation and bandaging would appear not so unintelligent, for the most dangerous time for inflammation is past, and the bones after this period will be found loose and easy to put in place. Still, even this treatment is much inferior to the use of bandages from the beginning, for that method results in the patients being without inflammation on the seventh day and ready for complete dressing with splints, while the former one is much slower, and has some other disadvantages; but it would take long to describe everything.

In cases where the fractured and projecting bones cannot be settled into their proper place, the following is the method of reduction. One must have iron rods made in fashion like the levers used by stone masons, broader at one end and narrower at the other. There should be three and even more than one may use those most suitable. Then one should use these, while extension is going on, to make leverage, pressing the under side of the iron on the lower bone, and the upper side against the upper bone, in a word just as if one would lever up violently a stone or log. The irons should be as strong as possible so as not to bend. This is a great help, if the irons are suitable and the leverage used properly; for of all the apparatus contrived by men these three are the most powerful in action – the wheel and axle, the lever and the wedge. Without some one, indeed, or all of these, men accomplish no work requiring great force. This lever method, then, is not to be despised, for the bones will be reduced thus or not at all. If, perchance, the upper bone over-riding the other affords no suitable hold for the lever, but being pointed, slips past, one should cut a notch in the bone to form a secure lodgement for the lever. The leverage and extension should be done on the first or second day, but not on the third, and least of all on the fourth and fifth. For to cause disturbance without reduction on these days would set up inflammation, and no less so if there was reduction; spasm, indeed, would much more likely be caused

if reduction succeeded than if it failed. It is well to know this, for if spasm supervenes after reduction there is not much hope of recovery. It is advantageous to reproduce the displacement, if it can be done without disturbance, for it is not when parts are more relaxed than usual that spasms and tetanus supervene, but when they are more on the stretch. As regards our subject, then, one should not disturb the parts on the days above mentioned, but study how best to oppose inflammation in the wound and favour suppuration. At the end of seven days, or rather more, if the patient is free from fever and the wound not inflamed, there is less objection to an attempt at reduction, if you expect to succeed; otherwise you should not give the patient and yourself useless trouble.

32. The proper modes of treatment after you reduce the bones to their place have already been described, both when you expect bones to come away and when you do not. Even when you expect bones to come away you should use in all such cases the method of separate bandages, as I said, beginning generally with the middle of the bandage as when an under-bandage is applied from two heads. Regulate the process with a view to the shape of the wound that it may be as little as possible drawn aside or everted by the bandaging: for in some cases it is appropriate to bandage to the right, in others to the left, in others from two heads.

33. As to bones which cannot be reduced, it should be known that just these will come away, as also will those which are completely denuded. In some cases the upper part of the bones are denuded, in others the soft parts surrounding them perish, and the starting point of the necrosis is, in some of the bones, the old wound, in others not. It is more extensive in some and less so in others, and some bones are small, others large. It follows from the above that one cannot make a single statement as to when the bones will come away, for some separate sooner owing to their small size, others because they come at the end [of the fracture] while others do not come away [as wholes] but are exfoliated after desiccation and corruption. Besides this, the treatment makes a difference. As a general rule, bones are most quickly eliminated in cases where

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suppuration is quickest, and the growth of new flesh most rapid and good; for it is the growth of new flesh in the lesion that as a rule lifts up the fragments. As to a whole circle of bone, if it comes away in forty days it will be a good separation, for some cases go on to sixty days or even more. The more porous bones come away more quickly, the more solid more slowly; for the rest, the smaller ones take much less time, and so variously. The following are the indications for resection of a protruding bone: if it cannot be reduced, but only some small portion seems to come in the way, and it is possible to remove it; if it is harmful, crushing some of the tissues, and causing wrong position of the part, and if it is denuded, this also should be removed. In other cases it makes no great difference whether there is resection or not. For one should bear clearly in mind that when bones are entirely deprived of soft parts and dried up they will all come away completely: and one should not resect those bones which are going to be exfoliated. Draw your conclusion as to bones which will come away completely from the symptoms set forth.

34. Treat such cases with compresses and vinous applications as described above in the case of bones about to be eliminated. Take care not to moisten with cold fluids at first, for there is risk of feverish rigors and further risk of spasms, for cold substances provoke spasms and sometimes ulcerations. Bear in mind that there must be shortening of the parts in cases where, when both bones are broken, they are treated while overlapping, also in cases where the circle of bone is eliminated entire.

35. Cases where the bone of the thigh or upper arm protrudes rarely recover; for the bones are large and contain much marrow, while the cords, muscles and blood-vessels which share in the injury are numerous and important. Besides, if you reduce the fracture, convulsions are liable to supervene, while in cases not reduced there are acute bilious fevers with hiccough and mortification. Cases where reduction has not been made or even attempted are no less likely to recover, and recovery is more frequent when the lower than when

the upper part of the bone projects. There may be survival even in cases where reduction is made, but it is rare indeed. There are great differences between one way of dealing with the case and another, and between one bodily constitution and another as to power of endurance. It also makes a great difference whether the bone protrudes on the inner or outer side of the arm or thigh, for many important blood-vessels stretch along the inner side, and lesions of some of them are fatal; there are also some on the outside, but fewer. In such injuries, then, one must not overlook the dangers or the nature of some of them, but foretell them as suits the occasion. If you have to attempt reduction and expect to succeed and there is no great overriding of the bone, and the muscles are not retracted (for they are wont to retract) leverage combined with extension would be well employed even in these cases.

36. After reduction one should give a mild dose of hellebore on the first day, if it is reduced on the first day, otherwise one should not even attempt it. The wound should be treated with the remedies used for the bones of a broken head. Apply nothing cold and prescribe entire abstinence from solid food. If he is of a bilious nature give him a little aromatic hydromel sprinkled in water, but if not, use water as beverage. And if he is continuously feverish keep him on this regimen for fourteen days at least, but if there is no fever, for seven days, then return by a regular gradation to ordinary diet. In cases where the bones are not reduced, a similar purgation should be made and so with the management of the wounds and the regimen. Likewise do not stretch the unreduced part, but even bring it more together so that the seat of the wound may be more relaxed. Elimination of the bones takes time, as was said before. One should especially avoid such cases if one has a respectable excuse, for the favourable chances are few, and the risks many. Besides, if a man does not reduce the fracture, he will be thought unskilful, while if he does reduce it he will bring the patient nearer to death than to recovery.

37. Dislocations at the knee and disturbances of the bones are much milder than displacements and dislocations at the elbow; for the articular end of the thigh-bone is more compact

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in relation to its size than is that of the arm-bone, and it alone has a regular conformation, a rounded one, whereas the articular end of the humerus is extensive, having several cavities. Besides this the leg-bones are about the same size, the outer one overtops the other to some little extent not worth mention,* and opposes no hindrance to any large movement though the external tendon of the ham arises from it. But the bones of the forearm are unequal, and the shorter [radius] much the thicker, while the more slender one [ulna] goes far beyond and overtops the joint. This, however, is attached to the ligaments at the common junction of the bones.† The slender bone has a larger share than the thicker one of the attachments of ligaments in the arm. Such then is the disposition of these articulations and of the bones of the elbow. Owing to the way they are disposed the bones at the knee are often dislocated‡ but easily put in, and no great inflammation or fixation of the joint supervenes. Most dislocations are inwards,§ but some outwards and some into the knee flexure. Reduction is not difficult in any of these cases: as to external and internal dislocations, the patient should be seated on the ground or something low, and have the leg raised, though not greatly. Moderate extension as a rule suffices; make extension on the leg and counter-extension on the thigh.

38. Dislocations at the elbow are more troublesome than those at the knee, and harder to put in, both because of the inflammation and because of the conformation of the bones, unless one puts them in at once. It is true that they are more rarely dislocated than the above, but they are harder to put up, and inflammation and excessive formation of callus is more apt to supervene.

39. [Dislocation of radius.] The majority of these are small displacements sometimes inwards, towards the side and ribs,

* A curious error, perhaps due to an effort to make the fibula resemble the ulna as far as possible. (The fibula does not reach the top of the tibia.)

† The ulna is attached to the ligaments of the elbow joint, at the point where it joins the radius.

‡ A strange remark, perhaps includes displacement of the kneecap. Displacements of cartilages are not noticed.

§ Of the thigh-bone.

sometimes outwards [our 'forwards' and 'backwards']. The joint is not dislocated as a whole, but maintaining the connection with the cavity of the humerus, where the projecting part of the ulna sticks out. Such cases, then, whether dislocation is to one side or the other, are easy to reduce, and direct extension in the line of the upper arm is quite enough; one person may make traction on the wrist, another does so by clasping the arm at the axilla, while a third presses with the palm of one hand on the projecting part and with the other makes counter-pressure near the joint.

40. Such dislocations yield readily to reduction if one reduces them before they are inflamed; the dislocation is usually rather inwards [forwards], but may also be outwards, and is easily recognized by the shape. And they are often reduced even without vigorous extension. In the case of internal dislocations one should push the joint back into its natural place, and turn the forearm rather towards the prone position. Most dislocations of the elbow are of this kind.

41. [Complete dislocation of the elbow backwards and forwards.] If the articular end of the humerus passes either this way or that over the part of the ulna which projects into its cavity (the latter* indeed occurs rarely, if it does occur), extension in the line of the limb is no longer equally suitable, for the projecting part of the ulna prevents the passage of the humerus. In patients with these dislocations, extension should be made after the manner which has been described above for putting up a fractured humerus. Make traction upwards from the armpit, and apply pressure downwards at the elbow itself, for this is the most likely way to get the humerus lifted above its own socket, and if it is so raised, replacement by the palms of hands is easy, using pressure with one hand to put in the projecting part of the humerus, and making counter-pressure on the ulna at the joint to put it back. The same method suits both cases. This has, indeed, less claim to be called the most regular method of extension in such a dislocation and reduction would also be made by direct extension, but less easily.

42. [Internal lateral distortion of the forearm.] Suppose the

*Refers to 'backwards', which can hardly occur without fracture.

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humerus to be dislocated forwards. This happens very rarely; but what might not be dislocated by a sudden violent jerk? For many other bones are displaced from their natural position, though the opposing obstacle may be great. Now, there is a great obstacle to this jerking out, namely the passage over the thicker bone [radius] and the extensive stretching of the ligaments, but nevertheless it is jerked out in some cases. Symptoms in cases of such jerkings out: they cannot bend the elbow at all, and palpation of the joint makes it clear. If, then, it is not reduced at once, violent and grave inflammation occurs with fever, but if one happens to be on the spot it is easily put in. One should take a hard bandage (a hard rolled bandage of no great size is sufficient) and put it crosswise in the bend of the elbow, suddenly flex the elbow, and bring the hand as close as possible to the shoulder. This mode of reduction is sufficient for such jerkings out. Direct extension, too, can accomplish this reduction. One must, however, use the palms, putting one on the projecting part of the humerus at the elbow and pushing backwards [our 'inwards'], and with the other making counter-pressure below the point of the elbow, inclining the parts into the line of the ulna. In this form of dislocation, the mode of extension described above as proper to be used in stretching the fractured humerus when it is going to be bandaged is also effective. And when extension is made, application of the palms should be made as described above.

43. [External lateral dislocation of forearm.] If the humerus is dislocated backwards [our 'inwards'] – this occurs rarely, and is the most painful of all, most frequently causing continuous fever with vomiting of pure bile, and fatal in a few days – the patient cannot extend the arm. If you happen to be quickly on the spot, you ought to extend the elbow forcibly, and it goes in of its own accord. But if he is feverish when you arrive, do not reduce, for the pain of a violent operation would kill him. It is a general rule not to reduce any joint when the patient has fever, least of all the elbow.

44. [Separation of radius.] There are also other troublesome lesions of the elbow. Thus the thicker bone is sometimes separated from the other, and they can neither flex nor extend

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the joint as before. The lesion is made clear by palpation at the bend of the elbow about the bifurcation of the blood-vessel* which passes upwards along the muscle.† In such cases it is not easy to bring the bone into its natural place, for no symphysis of two bones when displaced is permanently settled in its old position, but the diastasis [separation] necessarily remains as a swelling. How a joint ought to be bandaged was described in the case of the ankle.

45. [Fractures of olecranon.] There are cases in which the bone of the forearm [ulna] is fractured where it is subjacent to the humerus, sometimes the cartilaginous part from which the tendon at the back of the arm arises, sometimes the part in front at the origin of the anterior coronoid process, and when this occurs it is complicated with fever and dangerous, though the joint [articular end of humerus] remains in its place, for its entire base comes above this bone.‡ But when the fracture is in the place on which the articular head of the humerus rests, the joint becomes more mobile if it is a complete cabbage-stalk fracture [i.e. right across]. Speaking generally, fractures are always less troublesome than cases where no bones are broken, but there is extensive contusion of blood-vessels and important cords in these parts. For the latter lesions involve greater risk of death than do the former, if one is seized with continued fever. Still, fractures of this kind rarely occur.

46. Sometimes the actual head of the humerus is fractured at the epiphysis, but this, though apparently a very grave lesion, is much milder than injuries of the elbow joint.

47. How, then, each dislocation is most appropriately [reduced and] treated has been described; especially the value of immediate reduction owing to the rapid inflammation of the ligaments. For, even when parts that are put out are put in at once, the tendons are apt to become contracted and to hinder for a considerable time the natural amount of flexion and extension. All such lesions, whether avulsions, separations or

*Cephalic vein.

†Biceps.

‡The articular end of the humerus rests entirely on the olecranon, the arm being bent.

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dislocations, require similar treatment, for they should all be treated with a quantity of bandages, compresses and cerate, as with fractures. The position of the elbow should in these cases, too, be the same in all respects as in the bandaging of patients with fractured arm or forearm; for this position is most generally used for all the dislocations, displacements and fractures, and is also most useful as regards the future condition, in respect both of extension and flexion in the several cases, since from it the way is equally open in both directions. This attitude is also most easily kept up or returned to by the patient himself. And besides this, if ankylosis should prevail, an arm ankylosed in the extended position would be better away, for it would be a great hindrance and little use. If flexed, on the other hand, it would be more useful, and still more useful if the ankylosis occurred in an attitude of semi-flexion. So much concerning the attitude.

48. One should bandage by applying the head of the first roll to the place injured whether it be fractured, dislocated, or separated. The first turns should be made there and the firmest pressure, slackening off towards each side. The bandaging should include both fore and upper arm, and be carried much further each way than most practitioners do, that the oedema may be repelled as far as possible from the lesion to either side. Let the point of the elbow be also included in the bandage, whether the lesion be there or not, that the oedema may not be collected about this part. One should take special care in the dressing that, so far as possible, there shall be no great accumulation of bandage in the bend of the elbow, and that the firmest pressure be made at the lesion. For the rest, let him deal with the case as regards pressure and relaxation, in the same way, and according to the same respective periods, as was previously described in the treatment of fractured bones. Let the change of dressings take place every third day, and he should feel them relaxed on the third day, as in the former case. Apply the splints at the proper time – for their use is not unsuitable whether there is fracture or not, if there is no fever – but they should be applied as loosely as possible, those of the

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arm being under and those of the forearm on the top.* The splints should not be thick, and must be unequal in length in order to overlap one another where it is convenient, judging by the degree of flexion. So, too, as regards the application of compresses, one should follow the directions for the splints. They should be rather thicker at the point of lesion. The periods are to be estimated by the inflammation and the directions already given.

*Hippocrates had no angular splints, and straight ones applied to the bent arm above and below the elbow had to be so arranged that one set overlapped the other at the sides.

EMBRYOLOGY AND ANATOMY

TRANSLATED BY I. M. LONIE

THE SEED and THE NATURE OF THE CHILD*

These two treatises, together with the work known as Diseases IV, form the group of so-called embryological treatises. Cross-references within them imp'y that they were written by the same author, and many scholars have supposed that they were composed as a unity. Their chief interest lies in the insight they provide into one fourth-century writer's views on the growth of the embryo and on the problems of generation, heredity and sex differentiation.

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i. *All things are governed by law.* The sperm of the human male comes from all the fluid in the body: it consists of the most potent part of this fluid, which is secreted from the rest. The evidence that it is the most potent part which is secreted is the fact that even though the actual amount we emit in intercourse is very small, we are weakened by its loss. What happens is this: there are veins and nerves which extend from every part of the body to the penis. When as the result of gentle friction these vessels grow warm and become congested, they experience a kind of irritation, and in consequence a feeling of pleasure and warmth arises over the whole body. Friction on the penis and the movement of the whole man cause the fluid in the body to grow warm: becoming diffuse and agitated by the movement it produces a foam, in the same way as all other fluids produce foam when they are agitated. But in the case of the human being what is secreted as foam is the most potent and the richest part of the fluid. This fluid is diffused from the brain into the loins and the whole body, but in particular into the spinal marrow: for passages extend into this from the whole body, which enable the fluid to pass to and

*The text translated is one which is to appear in a new edition with translation and commentary being prepared by I. M. Lonie and Gerhard Baader for the series *Ars Medica*, published by Walter De Gruyter and Co., Berlin.

from the spinal marrow. Once the sperm has entered the spinal marrow it passes in its course through the veins along the kidneys (sometimes if there is a lesion of the kidneys, blood is carried along with the sperm). From the kidneys it passes via the testicles into the penis – not however by the urinary tract, since it has a passage of its own which is next to the urinary tract.

Those who have nocturnal emissions have them for the following reasons: when the fluid in the body becomes diffuse and warmed throughout – whether through fatigue or through some other cause – it produces foam. As this is secreted, the man sees visions as though he were having intercourse, for the fluid is precisely the same as that which is emitted in intercourse. However, erotic dreams and the nature and effects of this whole complaint, and why it is a precursor of insanity, are no part of my present subject. So much then for that.

2. The reason that eunuchs do not have intercourse is that their spermal passage is destroyed. The passage lies through the testicles themselves. Moreover, the testicles are connected to the penis by a mass of slender ligaments, which raise and lower the penis. These are cut off in the operation, and that is why eunuchs are impotent. In the case of those whose testicles are crushed, the spermal passage is blocked, for the testicles are damaged; and the ligaments, becoming calloused and insensitive as a result of the damage, are no longer able to tighten and relax. Those on the other hand who have had an incision made by the ear, can indeed have intercourse and emit sperm, but the amount is small, weak and sterile. For the greater part of the sperm travels from the head past the ears into the spinal marrow: now when the incision has formed a scar, this passage becomes obstructed. In the case of children their vessels are narrow and filled, and therefore prevent the passage of sperm, so that the irritation cannot occur as it does in the adult. Hence the fluid in the body cannot be agitated sufficiently to secrete sperm. Girls while they are still young do not menstruate for the same reason. But as both boys and girls grow, the vessels which extend in the boy's case to the penis and in the girl's to the womb become permeable and open up in the

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process of growth; a way is opened up through the narrow passages, and the fluid, finding sufficient space, can become agitated. That is why when they reach puberty, sperm can flow in the boy and the menses in the girl. Such is my explanation of these facts.

3. The sperm is, as I say, secreted from the whole body – from the hard parts as well as from the soft, and from the total bodily fluid. This fluid has four forms: blood, bile, water and phlegm. All four are innate in man, and they are the origin of disease. (I have already discussed these forms, and why both diseases and their resolutions come from them.)* I have now dealt with the subject of sperm: its origin, how and why it originates, and in the case of those who do not have sperm, why this is so; and I have dealt with menstruation in girls.

4. In the case of women, it is my contention that when during intercourse the vagina is rubbed and the womb is disturbed, an irritation is set up in the womb which produces pleasure and heat in the rest of the body. A woman also releases something from her body, sometimes into the womb, which then becomes moist, and sometimes externally as well, if the womb is open wider than normal. Once intercourse has begun, she experiences pleasure throughout the whole time, until the man ejaculates. If her desire for intercourse is excited, she emits before the man, and for the remainder of the time she does not feel pleasure to the same extent; but if she is not in a state of excitement, then her pleasure terminates along with that of the man. What happens is like this: if into boiling water you pour another quantity of water which is cold, the water stops boiling. In the same way, the man's sperm arriving in the womb extinguishes both the heat and the pleasure of the woman. Both the pleasure and the heat reach their peak simultaneously with the arrival of the sperm in the womb, and then they cease. If, for example, you pour wine on a flame, first of all the flame flares up and increases for a short period when you pour the wine on, then it dies away. In the same way the woman's heat flares up in response to the man's sperm, and

*The author refers to his treatise, now called *Diseases IV*, which Littré prints as a continuation of *The Nature of the Child*.

then dies away. The pleasure experienced by the woman during intercourse is considerably less than the man's, although it lasts longer. The reason that the man feels more pleasure is that the secretion from the bodily fluid in his case occurs suddenly, and as the result of a more violent disturbance than in the woman's case.

Another point about women: if they have intercourse with men their health is better than if they do not. For in the first place, the womb is moistened by intercourse, whereas when the womb is drier than it should be it becomes extremely contracted, and this extreme contraction causes pain to the body. In the second place, intercourse by heating the blood and rendering it more fluid gives an easier passage to the menses; whereas if the menses do not flow, women's bodies become prone to sickness. I shall explain why this is so in my course on women's diseases.* So much then for that subject.

5. When a woman has intercourse, if she is not going to conceive, then it is her practice to expel the sperm produced by both partners whenever she wishes to do so. If however she is going to conceive, the sperm is not expelled, but remains in the womb. For when the womb has received the sperm it closes up and retains it, because the moisture causes the womb's orifice to contract. Then both what is provided by the man and what is provided by the woman is mixed together. If the woman is experienced in matters of childbirth, and takes note when the sperm is retained, she will know the precise day on which she has conceived.

6. Now here is a further point. What the woman emits is sometimes stronger, and sometimes weaker; and this applies also to what the man emits. In fact both partners alike contain both male and female sperm (the male being stronger than the female must of course originate from a stronger sperm). Here is a further point: if (a) both partners produce a stronger sperm, then a male is the result, whereas if (b) they produce a weak form, then a female is the result. But if (c) one partner produces one kind of sperm, and the other another, then the

* Cf. ch. 15. The work referred to corresponds in part to the treatise *The Diseases of Women*.

resultant sex is determined by whichever sperm prevails in quantity. For suppose that the weak sperm is much greater in quantity than the stronger sperm: then the stronger sperm is overwhelmed and, being mixed with the weak, results in a female. If on the contrary the strong sperm is greater in quantity than the weak, and the weak is overwhelmed, it results in a male. It is just as though one were to mix together beeswax with suet, using a larger quantity of the suet than of the beeswax, and melt them together over a fire. While the mixture is still fluid, the prevailing character of the mixture is not apparent: only after it solidifies can it be seen that the suet prevails quantitatively over the wax. And it is just the same with the male and female forms of sperm.

7. Now that both male and female sperm exist in both partners is an inference which can be drawn from observation. Many women have borne daughters to their husbands and then, going with other men, have produced sons. And the original husbands – those, that is, to whom their wives bore daughters – have as the result of intercourse with other women produced male offspring; whereas the second group of men, who produced male offspring, have with yet other women produced female offspring. Now this consideration shows that both the man and the woman have male and female sperm. For in the partnership in which the women produced daughters, the stronger sperm was overwhelmed by the larger quantity of the weaker sperm, and females were produced; while in the partnership in which these same women produced sons, it was the weak which was overwhelmed, and males were produced. Hence the same man does not invariably emit the strong variety of sperm, nor the weak invariably, but sometimes the one and sometimes the other; the same is true in the woman's case. There is therefore nothing anomalous about the fact that the same women and the same men produce both male and female sperm: indeed, these facts about male and female sperm are also true in the case of animals.

8. Sperm is a product which comes from the whole body of each parent, weak sperm coming from the weak parts, and strong sperm from the strong parts. The child must necessarily

correspond. If from any part of the father's body a greater quantity of sperm is derived than from the corresponding part of the mother's body the child will, in that part, bear a closer resemblance to its father; and vice versa. The following cases however are impossible: (a) the child resembles its mother in all respects, and its father in none; (b) the child resembles its father in all respects, and its mother in none; (c) the child resembles neither parent in any respect. No: it must inevitably resemble each parent in some respect, since it is from both parents that the sperm comes to form the child. The child will resemble in the majority of its characteristics that parent who has contributed a greater quantity of sperm to the resemblance, and from a greater number of bodily parts. And so it sometimes happens that although the child is a girl she will bear a closer resemblance in the majority of her characteristics to her father than to her mother, while sometimes a boy will more closely resemble his mother. All these facts too may be regarded as evidence for my contention above, that both man and woman have male and female sperm.

9. Another thing which sometimes happens is that children are undersized and sickly, although both parents are large-bodied and strong. If this occurs subsequently to the birth of several children who are healthy like their parents, then it is clear that the child's sickness began in the womb; the womb was more open than normal, and some of the child's nutriment from the mother escaped, hence the weakness of the child – and of course all living things fall sick to a degree in proportion to their normal strength. If on the other hand *all* the children born to a particular mother are weakly, the cause is the constriction of the womb. For if the space in which the embryo is nurtured is not adequate, obviously it will be undersized, since it will have insufficient space to grow in. Whereas if (a) it has plenty of space and (b) it contracts no sickness, then it is reasonable to expect that a large offspring will be born to large parents. It is similar to what happens if you place in a narrow vessel a cucumber which has finished flowering but is still young and still growing from the bed. The cucumber will grow to a size and shape equal to the inside of the

vessel. But if you place it in a large vessel – one which is large enough to take a cucumber but which does not greatly exceed the natural size of the plant – then the cucumber will grow to a size and shape equal to the interior of this vessel: in its growth it attempts to rival the space in which it grows. In fact, it is generally true that all plants will grow in the way one compels them to. It is the same with the child: if he has plenty of space during his period of growth, he becomes larger; whereas if the space is confined, he will be smaller.

10. When the child is deformed in the womb, I consider that this occurs (a) as the result of a contusion. The mother has received a blow in the part where the embryo is, or has had a fall, or suffered some other violence. A deformity results in the place where the contusion occurred. When the contusion is extensive, the membrane enveloping the embryo is broken, and it is aborted. (b) Children may be deformed in another way: if there is some constriction in that region of the womb which is contiguous to the part in which the embryo is deformed, it must be the case that deformity occurs there as a result of the embryo's movement in the constricted space. A similar thing happens to trees which have insufficient space in the earth, being obstructed by a stone or the like. They grow up twisted, or thick in some places and slender in others, and this is what happens to the child as well, if one part of the womb constricts some part of its body more than another.

11. The children of deformed parents are usually sound. This is because although an animal may be deformed, it still has exactly the same *components* as what is sound. But when there is some disease involved, and the four innate species of the fluid from which the seed is derived form sperm which is not complete, but deficient in the deformed part, it is not in my opinion anomalous that the child should be deformed similarly to its parent.

So much then for this subject: I shall now return to my main argument.

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12.* If the seed which comes from both parents remains in the womb of the woman, it is first of all thoroughly mixed together – for the woman of course does not remain still – and gathers into one mass which condenses as the result of heat. Next, it acquires breath, since it is in a warm environment. When it is filled with breath, the breath makes a passage for itself in the middle of the seed and escapes. Once this passage of escape for the warm breath has been formed, the seed inspires from the mother a second quantity of breath, which is cool. It continues to do this throughout the whole period: the warmth of its environment heats it, and it acquires cold breath from the mother's breathing. In fact everything that is heated acquires breath: the breath breaks a passage for its escape to the outside, and through this break the object which is being heated draws a second lot of cold breath, by which it is fed. The same process occurs with wood, or with leaves, or with food and drink, when they are heated vigorously. You can see what happens from the case of burning wood – any kind of wood will behave in the same way, but green wood in particular. It will expel air where it has been cut, and when this air gets outside, it eddies around the cut. This is a matter of common observation, and the inference is obvious: the air in the wood, since it is hot, draws to itself cold air to feed upon, at the same time as it expels air. If this were not the case, then neither would the air eddy as it is expelled. For everything which is heated is fed by a proportionate quantity of cold. Now when the fluid in the wood is heated, it becomes air which then passes outside. As this air is expelled, the heat in the wood draws in cold air to replace it and to nourish itself. Green leaves also do the same when they are burned, for they contain air; and this air breaks a passage out for itself and escapes, eddying as it goes and making a crackling sound at the place where the air is also drawn in. Legumes, cereals and nuts also form air when they are heated, and this air makes a fissure

* In modern editions the numbering of the chapters of *The Nature of the Child* follows on from that of *The Seed*.

and escapes, and if these materials are moist, the greater the quantity of air released, and the larger the fissure. However, there is no need to labour the point that everything which is subjected to heat both emits air and draws in the nutriment of cold air by the same passage. Such then are the proofs which I adduce in support of the contention that the seed, heated in the womb, both contains and emits breath. However, there is a second source of breath for the seed: this is the breathing of the mother; for when the mother breathes in cold air from the outside, the seed gets the benefit of it: the seed is made warm by the warmth of its environment, and so it contains and emits breath.

As it inflates, the seed forms a membrane around itself; for its surface, because of its viscosity, stretches around it without a break, in just the same way as a thin membrane is formed on the surface of bread when it is being baked; the bread rises as it grows warm and inflates, and as it is inflated, so the membranous surface forms. In the case of the seed, as it becomes heated and inflated the membrane forms over the whole of its surface, but the surface is perforated in the middle to allow the entrance and exit of air. In this part of the membrane there is a small projection, where the amount of seed inside is very small; apart from this projection the seed in its membrane is spherical.

13. As a matter of fact I myself have seen an embryo which was aborted after remaining in the womb for six days. It is upon its nature, as I observed it then, that I base the rest of my inferences. It was in the following way that I came to see a six-day-old embryo. A kinswoman of mine owned a very valuable danseuse, whom she employed as a prostitute. It was important that this girl should not become pregnant and thereby lose her value. Now this girl had heard the sort of thing women say to each other – that when a woman is going to conceive, the seed remains inside her and does not fall out. She digested this information, and kept a watch. One day she noticed that the seed had not come out again. She told her mistress, and the story came to me. When I heard it, I told her to jump up and down, touching her buttocks with her

heels at each leap. After she had done this no more than seven times, there was a noise, the seed fell out on the ground, and the girl looked at it in great surprise. It looked like this: it was as though someone had removed the shell from a raw egg, so that the fluid inside showed through the inner membrane – a reasonably good description of its appearance. It was round, and red; and within the membrane could be seen thick white fibres, surrounded by a thick red serum; while on the outer surface of the membrane were clots of blood. In the middle of the membrane was a small projection: it looked to me like an umbilicus, and I considered that it was through this that the embryo first breathed in and out. From it, the membrane stretched all around the seed. Such then was the six-day embryo that I saw, and a little further on I intend to describe a second observation which will give a clear insight into the subject. It will also serve as evidence for the truth of my whole argument – so far as is humanly possible in such a matter. So much then for this subject.

14. The seed, then, is contained in a membrane, and it breathes in and out. Moreover, it grows because of its mother's blood, which descends to the womb. For once a woman conceives, she ceases to menstruate – except in some cases where a very small amount appears, no more than a token, during the first month – otherwise the child will be unhealthy. The blood instead descends from the whole body of the woman and surrounds the membrane on the outside. This blood is drawn into the membrane along with the breath, where the membrane is perforated and projects; and by coagulating, it causes the increase of what is to become a living thing. In due course, several other thin membranes form within the original one, these being formed in the same way as the first. Like it, they too extend from the umbilicus, and there are connections between them.

15. At this stage, with the descent and coagulation of the mother's blood, flesh begins to be formed, with the umbilicus, through which the embryo breathes and grows, projecting from the centre.

The reason that a pregnant woman does not suffer from the

fact that the menses have ceased to flow, is that the blood is no longer agitated by a massive flux occurring once a month. Instead, it flows gently into the womb in small amounts each day without causing discomfort, and what is contained in the womb increases. And it flows each day, rather than all at once every month, because the embryo in the womb draws it continually from the body, in proportion to its strength. Its respiration also works in the same way: respiration is at first slight, and the amount of blood flowing from the mother is slight as well. As respiration increases, the embryo draws the blood to itself more vigorously, and the amount flowing into the womb increases in quantity.

The reason why women who are not pregnant experience pain when the menses do not flow is this: in the first place, the blood in the body is set in agitation each month, by the following cause. There is a great difference in temperature between month and month. Now a woman's body has more fluid than that of a man, and is therefore sensitive to this change; and as a result her blood becomes agitated, fills up her veins and flows away from her. This is simply a fact of woman's original constitution. The result of all this is that when a woman is emptied of blood, she conceives; whereas if she is full of blood, she does not conceive. It is when the womb and veins are empty that women conceive; hence the most favourable time for conception is just after menstruation, and the reason is as I have stated. Now when the blood is agitated and secreted but, instead of flowing away, flows into the womb and the womb does not release it, then the womb is heated by the blood which lingers in it and in turn heats the rest of the body. Sometimes too the womb will discharge blood into the veins, and these, becoming filled, grow painful and cause swellings. There is sometimes a danger that a woman will be actually crippled when this happens. Sometimes the womb settles against the bladder and, by pressing upon it and closing it, causes a strangury; or sometimes it settles against the hip or the lumbar regions, causing pain there. In some cases, the blood has been known to remain in the womb for as long as five or six months, where it corrupts and becomes pus. Some

women pass out this pus through the vagina, while in other cases it forms a tumour in the groin, so that the pus is expelled in that way. In fact, women suffer many maladies of this kind when their menses do not flow, but this is not the proper place to discuss them: they will be described in my course on women's diseases. I will now pick up my argument where I left it off.

16. Once the flesh is formed, the membranes continue to grow commensurately with the embryo. These form pouches, particularly the outside membrane. Into these pouches passes whatever blood is left over and serves no useful purpose after the embryo has drawn it from the mother by respiration and used it to grow with. When these membranes form pouches and fill with blood, they are called the 'chorion'.

17. As the flesh grows it is formed into distinct members by breath. Each thing in it goes to its similar – the dense to the dense, the rare to the rare, and the fluid to the fluid. Each settles in its appropriate place, corresponding to the part from which it came and to which it is akin. I mean that those parts which came from a dense part in the parent body are themselves dense, while those from a fluid part are fluid, and so with all the other parts: they all obey the same formula in the process of growth. The bones grow hard as a result of the coagulating action of heat; moreover they send out branches like a tree. Both the internal and external parts of the body now become more distinctly articulated. The head begins to project from the shoulders, and the upper and lower arms from the sides. The legs separate from each other, and the sinews spring up around the joints. The mouth opens up. The nose and ears project from the flesh and become perforated; while the eyes are filled with a clear fluid. The sex of the genitals becomes plain. The entrails too are formed into distinct parts. Moreover, the upper portions of the body now respire through the mouth and nostrils, with the result that the belly is inflated and the intestines, inflated from above, cut off respiration through the umbilicus and put an end to it. A passage outside is formed from the belly and intestines through the anus, and another one through the bladder.

Now the formation of each of these parts occurs through respiration – that is to say, they become filled with air and separate, according to their various affinities. Suppose you were to tie a bladder onto the end of a pipe, and insert through the pipe earth, sand and fine filings of lead. Now pour in water, and blow through the pipe. First of all the ingredients will be thoroughly mixed up with the water, but after you have blown for a time, the lead will move towards the lead, the sand towards the sand, and the earth towards the earth. Now allow the ingredients to dry out and examine them by cutting around the bladder: you will find that like ingredients have gone to join like. Now the seed, or rather the flesh, is separated into members by precisely the same process, with like going to join like. So much, then, on that subject.

18. By now the foetus is formed. This stage is reached, for the female foetus, in forty-two days at maximum, and for the male, in thirty days at maximum. This is the period for articulation in most cases, take or give a little. And the lochial discharge too after birth is usually completed within forty-two days if the child is a girl. At least this is the longest period which completes it, but it would still be safe even if it took only twenty-five days. If the child is a boy, the discharge takes thirty days – again the longest period, but there is no danger even if it takes only twenty days. During the latter part of the period the amount which flows is very small. In young women, the discharge takes a smaller number of days; more, when women are older. It is the women who are having their first child who suffer the most pain during the birth and during the subsequent discharge, and those who have had fewer children suffer more than those who have had a greater number.

Now then, the reason for the discharge after birth is this: during the earlier period of gestation – up to forty-two days for a girl, and thirty for a boy – the least amount of blood flows to cause the embryo to grow, while after this period the amount increases right up to the time the woman gives birth. We must expect then that the lochial discharge will correspond and flow out in accordance with the number of these days.

The woman's birth-pangs begin in the following way: her

blood is agitated and becomes very warm through the movement of the infant who is sturdy by this time. Once the blood is agitated, there issues first of all (after the child) a thick bloody serum: this opens up a way for the blood, as in the case of 'the water on the table'.* This purgation then flows each day, up to the time I have stated; the initial amount being one and a half Attic measures,† more or less, and so on proportionately until the flow ceases. If the woman is in a good state of health and is likely to remain so, the blood flows as it does from a sacrificial animal, and clots quickly. But if her health is bad, the flow is less, unhealthy in appearance, and is slow to coagulate. (In such cases, if the pregnant woman has a disease which is not constitutional, she will die during the lochial period. If the lochial flow does not begin immediately during the first period of days, whether she is in good health or not, but subsequently the flow comes in a rush, whether induced by medication or spontaneously, the flow will be in proportion to the number of days during which it did not flow all at once.‡ For if a woman is not thoroughly purged of the lochia, she becomes gravely ill with a risk of dying, unless she is treated swiftly and the purgation is eventually induced.) The reason that I have introduced these details, is to show that the limbs are differentiated at the latest, in the case of girls, in forty-two days, and thirty days for boys; and I take as evidence for the assertion the fact that the lochial discharge lasts for forty-two days after a girl, and for thirty after a boy, these being the maximum periods.

And now I shall state the whole thing over again, for the sake of clarity. I maintain that the flow is proportionate, because while the seed is in the womb, the amount of blood which flows into the womb from the mother who carries a female child is least during the initial period of forty-two days, the period within which the limbs are differentiated. From

* Presumably the author refers to a familiar demonstration, either of air pressure or of surface tension, but nothing is known of its precise form.

† The Attic measure (*Kotyle*) was 0.226 litres.

‡ i.e. the lochia are identical with menstrual blood, which does not flow 'all at once' but day by day once conception has occurred. Cf. ch. 15.

this time, the flow increases. And again, in the case of a male child, the same thing happens, only this time the period is thirty days. Here is further evidence for the truth of these facts: in the days immediately following the receipt of seed in the womb, the quantity of blood flowing from the mother into the womb is least, and subsequently it increases. For if a large amount were to flow all at once, the embryo could not breathe, but would be choked by the large flow of blood. In the purgation, on the other hand, the proportion is inverse; for here the flow is greatest in the initial period, and it then decreases until it finishes. Again, many women have miscarried with a male child a little earlier than thirty days, and the embryo has been observed to be without limbs; whereas those that were miscarried at a later time, or on the thirtieth day, were clearly articulated. So too in the case of female embryos which are miscarried, the corresponding period being forty-two days, articulation is observed. Hence it is manifest, both by reasoning and by necessity, that the period of articulation is, for a girl, forty-two days, and for a boy, thirty. The evidence is to be found both in abortion and in lochial purgation; while the cause is that the female embryo coagulates and is differentiated later, since the female seed is both weaker and more fluid than the male; so that it necessarily follows in accordance with this explanation that the female coagulates later than the male. This is also why purgation takes longer after a female birth than after a male birth. I now return to the point where I left off.

19. Once the embryo's limbs are articulated and shaped, as it grows its bones become both harder and hollow, this too being effected by breath. Once the bones are hollow, they absorb the richest part of clotted blood from the flesh. In due course the bones at their extremities branch out, just as in a tree it is the tips of the branches which are last to shoot forth twigs. It is in the same way that the child's fingers and toes become differentiated. Further, nails grow on these extremities, because all the veins in the human body terminate in the fingers and toes. Now of these veins, the largest are those which are in the head, and next to these, those in the legs and in the upper

and lower arms. But it is in the feet and hands that both the veins and nerves are thinnest and most numerous and most dense, and the bones too. This is particularly true of the fingers and toes. Now it is because the fingers and toes have bones, veins and nerves which are small and dense that the nails, which are also thin and dense, grow out of them. Their effect is to cut short the extremities of the veins, preventing them from growing any further, or one from being longer than another. So that it is perfectly natural that the nails, being at the body's extremities, should be very dense, for what they come from is very dense.

20. The hair takes root in the head at the same time as the nails grow. Hair grows in the following way: it grows longest and most abundantly where the epidermis is most porous and where the hair can receive the right amount of moisture for its nutrition. Where the epidermis becomes porous subsequently, there too the hair grows subsequently – namely, on the chin, the pubes, and other such places. Both the flesh and the epidermis become porous at the time when sperm first makes its appearance; and at the same time the veins open out more than they did previously. For during childhood, the veins are narrow, and do not give passage to the sperm. The same is true of menstruation in girls: in their case, the way is opened for menstruation and the passage of sperm at the same time. Now when the epidermis becomes porous, pubic hair begins to grow both in girls and boys, the hair now having sufficient moisture for its nutriment. The explanation of the growth of hair upon a man's chin is the same: here too the epidermis becomes porous, when moisture coming from the head flows into it. For both during intercourse and during the intervening times, the hair has the proper amount of moisture for its nutriment; but this is so most of all when the fluid in its course from the head during intercourse is delayed by its arrival at the chin, which projects forward of the breast. The evidence that hair grows where the epidermis is most porous is this: if you were to burn the epidermis just enough to raise a blister, which you then healed, the epidermis on the scar would become dense and would not grow hair.

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The reason that those who are made eunuchs while they are still children neither become pubescent nor grow hair on their chins, but are hairless over their whole body, is that no passage is opened for the sperm, and therefore the epidermis does not become porous anywhere on the body (I have stated earlier that the passage for the sperm is cut off in eunuchs). Women also are hairless on their chin and over the body, because during intercourse their bodily fluid is not agitated to the same extent as in men, and therefore does not make the epidermis porous.

Those who are bald are so because their constitution is phlegmatic: for during intercourse the phlegm in their heads is agitated and heated, and impinging upon the epidermis burns the roots of their hair, so that the hair falls out. For the same reason, eunuchs do not become bald, because they do not experience the violent movement of intercourse which would heat the phlegm and cause it to burn the hair-roots.

The explanation of grey hair is that after fluid has been agitated in the body over a long period, its whitest part is separated off and arrives at the epidermis: the hair grows whiter because the moisture which it attracts is whiter than it was previously, while the epidermis is whiter in places where the hair is white. Those too who have a white head of hair from birth show a whiter epidermis where the hair is white; for it is there that the whitest part of the bodily fluid is. In fact, the complexion of the skin and the colour of the hair correspond to the colour of the moisture which the flesh attracts – white, or red, or black. Having said so much on this subject, I return to the remainder of my discourse.

21. The embryo starts to move once the extremities of the body have branched and the nails and hair have taken root. The time which it takes for this to happen is three months for males, and four for females. That at least is generally the case, although some infants start to move earlier. The reason why a male embryo starts to move earlier is its greater strength; moreover, the male is compacted earlier, since the seed from which it comes is stronger and thicker. As soon as the embryo has started to move, the mother's milk makes its appearance:

her breasts swell and the nipples grow erect, although so far the milk does not flow. The appearance and the flow of milk occur later in those women whose flesh is of a dense texture, and earlier in those who have loose-textured flesh. The cause of lactation is as follows: when the womb becomes swollen because of the child it presses against the woman's stomach, and if this pressure occurs while the stomach is full, the fatty parts of the food and drink are squeezed out into the omentum and the flesh. The process is the same as when you smear a hide with large quantities of oil and, after giving the hide time to absorb the oil, you squeeze it, and the oil oozes out again under pressure. In exactly the same way, the stomach, containing the fatty portions of food and drink, percolates the fat into the omentum and the flesh, under the pressure of the womb. If the woman's flesh has a loose texture, she feels the effect of the percolation all the sooner; but later, if her flesh is not of this type. Moreover, pregnant animals, provided they are not diseased, grow fatter than animals which are not pregnant, although their food and drink is exactly the same. This is also true of pregnant women. Now from this fatty substance, which is warmed and white in colour, that portion which is made sweet by the action of heat coming from the womb is squeezed into the breasts. A small quantity goes to the womb as well, through the same vessels: for the same vessels and others similar to them extend alike to the breasts and the womb. When it arrives in the womb it has the appearance of milk, and the embryo uses a small quantity; while the breasts are filled with it and swell. When the child is born, it is the act of suckling itself which causes the milk to flow into the breasts, once the whole process has been set going initially. For in fact, when the breasts give suck the veins into them become more permeable, and because they become more permeable they can attract the fatty substance from the stomach and pass it along into the breasts. It is similar to the case of a man who enjoys intercourse frequently: the veins become more permeable, thereby inducing him to further intercourse.

22. Nutrition and growth depend on what arrives from the mother into her womb; and the health or disease of the child

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corresponds to that of the mother. In just the same way, plants growing in the earth receive their nutriment from the earth and the condition of the plant depends on the condition of the earth in which it grows. Now when a seed is planted in the earth, it is filled with moisture from it (the earth contains many different varieties of moisture, which is why it can nurture plants). Once the seed is filled with moisture, it becomes inflated and swells. Now there is a potency in the seed: when the lightest part of this potency is condensed and compressed by breath and the moisture in the seed, it turns into green shoots and breaks the seed open. This is what happens at first: the shoots sprout upwards, but once they have sprouted, then the moisture in the seed is no longer sufficient for their nutrition. So the seed and its shoots break open in a downward direction: the shoots force the seed to release downwards that part of its potency which has been left behind owing to its weight, and roots are produced extending from the shoots.

Once the plant has taken firm root below and begins to derive its nutriment from the earth, then the whole seed is absorbed by the plant and disappears, excepting the husk, which is the most solid part of the seed. Eventually this too rots in the earth and disappears. After a time, some of the shoots send out branches.

Now the plant, since it comes from a seed, that is, from something moist, while it remains tender and moist and strives to grow upwards and downwards, cannot put forth fruit. The reason is that its potency is not strong and rich enough to be compacted into fruit. But when time has made the plant firm and rooted it, it develops broad veins running upwards and downwards, so the substance it draws from the earth is no longer watery, but thicker and more fatty and greater in quantity. This substance is heated by the sun, and erupts into the tips of the plant, where it becomes fruit of the same kind as what it came from. The reason for the abundance of fruit, despite its small origin, is that every plant draws from the earth more potency than did the seed from which it originated, and this potency erupts not simply in one place but in many; and once the fruit has broken out, it is nurtured subsequently by

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the plant, which draws upon the earth and transmits what it draws to the fruit. It is the sun which ripens and firms the fruit, by evaporating its more watery part. So much then for those plants which grow out of seeds, from the earth and water.

23. When trees are grown from slips, on the other hand, what happens is this: the cutting has a fracture at its lower end (where it was broken off from the parent tree), the end which is placed in the earth. This end sends out roots in the following way: when the plant is in the earth, and draws up moisture from the earth, it swells and becomes full of breath, though this is not yet the case with the part projecting above the earth. But in the lower part, the breath and moisture cause the heaviest portion of the plant's potency to condense and break forth in a downward direction; from it grow delicate roots. Once the plant has taken root below, it draws moisture from the root and imparts it to the portion above the ground. And so in its turn the upper portion too swells and acquires breath; and such of the potency of the plant as is light condenses and grows out in the form of shoots: thereafter the plant grows both upwards and downwards. So the process of sprouting in the case of plants grown from seeds is just the opposite to the process in plants grown from slips: the shoots grow upwards from the seed before the roots grow downwards, whereas the tree takes root first, and only later puts out leaves. The reason is that there is a quantity of moisture in the seed itself, and since the seed is wholly contained in the ground, it has, initially, sufficient nutriment to feed its shoots until it becomes rooted. This is not the case with the cutting, for it does not grow from something else which provides the leaves with their initial nutriment; instead, the cutting is like the tree, which has its greatest bulk above the earth, and so cannot be filled with moisture above the earth without some great potency coming from below to transmit moisture to the upper parts. So that at first the slip must necessarily sustain itself from the earth by means of its roots, and only subsequently transmit upwards the moisture which it attracts from the earth, and so blossom into leaves, and grow.

24. I shall now describe what causes the plant to branch as

it grows. Once it has drawn an excessive amount of moisture from the earth, this superabundance causes it to break out at the point where most has collected and it is here that the plant branches. The reason that it increases in size both laterally and upwards and downwards is that the earth below its surface is warm in winter and cool in summer. This is because in winter the rain falling from the sky makes the earth moist and, since moisture is heavy, compressed upon itself. Accordingly, the earth becomes more dense and, because it has no large pores, it is unventilated. That is why the earth under its surface is warm in the winter. Dung too is warmer when it is compressed than if it is loosely packed, and in general, substances which are moist and compressed grow warm spontaneously and are quick to rot because they get burnt up by the heat: their compression prevents the air from penetrating them. Whereas if they are dry and loosely packed, they are much slower to grow warm and to rot. Corn and barley too, if they are moist and packed together, are more likely to grow warm than when they are dry and lie loosely. Leather garments also, if you tie them together and compress them very tightly, are consumed spontaneously as though by fire. This is something I have observed myself. In fact you only have to consider to realize that everything which is compressed upon itself grows warmer than what is loosely packed, the reason being that these substances cannot be ventilated and cooled by the wind. Now the case is the same with the earth: under its surface it is dense and compacted upon itself as a result of the weight of moisture in it, and so it is warm during winter since it has no ventilation for its heat. Now when rain falls upon the earth, and then sends forth an exhalation, this exhalation is obstructed by the earth's density, and is forced back into the water. This is why springs during the winter are both warmer and flow more abundantly than during the summer: the air exhaled from the water goes back into the water, since the earth is dense and the air cannot penetrate it. This large quantity of water breaks out and flows where it can, and makes a broader passage for itself than if it were only a small quantity. (For water in the earth does not remain at rest, but regularly flows

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downwards.) Whereas if it were the case that the earth during winter offered a passage through itself to the air exhaled by the water, the water flowing from the earth would be less in quantity, and springs would not be abundant during winter. I have mentioned all these facts to show that the earth under its surface is warmer during winter than during summer.

25. Now for the reason why during the summer the earth is colder under its surface than in winter. (i) During the summer the earth is porous and light, because the sun evaporates its moisture (the earth of course always has some moisture in itself, in smaller or larger quantities). (ii) All winds come from water – you can deduce the truth of this from the fact that winds always blow off rivers and clouds, and clouds are simply water cohering together in the air. So then: the earth is porous and light during the summer, and it contains water. This water flows downwards, and as it does so it exhales from itself a constant stream of air. This air permeates the earth, which is light and porous, and cools it; and the water itself is chilled at the same time. What happens is the same as if you were to compress tightly a skin containing water, and having made a breathing hole for the water with a needle point, or perhaps something a little larger, to hang the whole skin up and cause it to oscillate. You will find that no breath, but only water, passes through the perforation: the reason being that the water does not have a sufficiently wide passage to exhale air. Now this corresponds to water in the earth during winter. But if before hanging up the skin and causing it to oscillate you make a wide passage for the water, it will be the case that air passes through the perforation; for the air (which comes from the water as it moves) will have a sufficiently wide passage to escape through the skin, and that is why the air passes through the hole. This, then, is the case with the water in the earth during summer. It has a sufficiently wide passage, since the sun has made the earth porous by drawing up its water, and the air, which is cold because it comes from the water, penetrates the porous and light earth, and in this way makes the earth cool beneath its surface in summer. Furthermore the water, which is the cause of the coldness of the air in the

earth, receives this air back into itself as well as emitting it into the earth.

In the same way too, drawing water from a well keeps the air in motion like a puff of wind, and causes it to chill the water; whereas if the water is not drawn during the summer but is left standing, because of its density it does not admit the air from the earth to the same extent, nor does it emit it into the earth. Instead, when it is allowed to remain stagnant in the well and is not moved about, it is warmed by the sun and the air superficially at first, then the heat is transmitted down through successive layers. This is why well-water which is not drawn in the summer is warmer than that which is drawn (note that springs which come from deep underground are always cold in the summer). When in the winter water is drawn from the earth, it is initially warm – the earth itself being warm – but as time passes it becomes cold: this is obviously due to the effect of the air, which is cold, for the wind aerates the water, allowing breath to penetrate it. In the same way water which is drawn from a well during summer is cold initially, and then grows warm: the reason being that it is chilled by the air which circulates through the porous earth; whereas once it has been drawn and left standing for a while, it is observed to grow warm, because the air is warm. Water which is left undisturbed in a well during summer grows warm for the same reason. So much, then, on this subject.

26. To return, then, to my original point, that the earth below its surface is cool in summer, warm in winter, while above the surface the opposite is true. Now if a tree is to be sound, it must not be affected by two lots of heat simultaneously, nor two lots of cold: if it is affected by heat above the ground it must be affected by cold below the ground, and vice versa. The roots distribute to the tree whatever they attract, while the tree distributes whatever it attracts to the roots: there is in effect an equal dispensation of heat and cold. Just as when a man takes into his stomach those foods which cause heat when they are digested, he requires a compensatory cooling from drink, so too in the case of a tree the lower parts must compensate the upper, and vice versa. This is in fact the

reason why a tree grows both upwards and downwards: it is because it receives nutriment from above as well as from below. While it is still very tender it does not bear fruit: so far, it has no thick and fatty potency capable of producing fruit. But after a time, its veins become sufficiently wide to draw thick and fatty substance from the ground. The sun then melts this substance, lightening it, and causing it to erupt into the tree's extremities and become fruit. The sun also evaporates the thin portion of the moisture from the fruit, while it sweetens the thicker part by warming and ripening it. The reason why some kinds of tree do not bear fruit is that they contain insufficient fatty substance to contribute to fruiting.

Trees cease to grow once time has made them solid, and they have taken firm hold below with their roots. Some trees, however, grow from grafts implanted into other trees: they live implanted in these trees and produce fruit, but the fruit is different from that of the tree on which they are grafted. This is how: first of all the graft produces buds, for initially it still contains nutriment from its parent tree, and only subsequently from the tree in which it was engrafted. Then, when it buds, it puts forth slender roots into the tree, and feeds initially on the moisture actually in the tree in which it is engrafted. Then in course of time it extends its roots directly into the earth, through the tree in which it was engrafted; thereafter it uses the moisture which it draws up from the ground, and that is how it is nurtured – from the ground. There is therefore nothing anomalous in the fact that grafts bear different fruit: it is because they live from the ground. So much then for trees and their fruit – I could hardly avoid giving a complete account of the subject.

27. But to return to the main argument which was my reason for introducing these matters. I maintain, then, that all plants which grow in the ground live off the moisture which comes from the ground, and that the character of the plant depends on the character of this moisture. Now it is in just the same way that the child in the womb lives from its mother, and it is on the condition of health of the mother that the condition of health of the child depends. But in fact, if you review what

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I have said, you will find that from beginning to end the process of growth in plants and in humans is exactly the same. So much for that subject.

28. The child while it is in the womb has its hands tucked against its chin, while its head lies near its feet. However it is not possible to decide with any accuracy whether its head is above or below – not even if you actually see the child in the womb. The child is held in its place by the membranes which extend from the umbilicus.

29. Now I come to the observation which I promised to describe a little earlier – one which will make the matter as clear as is humanly possible to anyone who wishes to know that the seed is contained in a membrane which has an umbilicus in the centre, and that the seed initially draws breath into itself and expires it, and that membranes extend from the umbilicus. Furthermore (if you accept the evidence which I am about to give) you will find that the growth of the infant is from beginning to end exactly as I have described it in my discourse. If you take twenty or more eggs and place them to hatch under two or more fowls, and on each day, starting from the second right up until the day on which the egg is hatched, you take one egg, break it open and examine it, you will find that everything is as I have described – making allowance of course for the degree to which one can compare the growth of a chicken with that of a human being. You will find for instance that there are membranes extending from the umbilicus – in fact, that in every point all the phenomena I have described in the human child are to be found in a chicken's egg also. Yet if a man had not actually seen it, he would find it hard to believe that there is an umbilicus in a chicken's egg. But it is so; so much, then, for that.

30. When it is time for the mother to give birth, what happens is that the child by the spasmodic movements of its hands and feet breaks one of the internal membranes. Once one is broken, then the others of course are weaker, and these break too in order of their proximity to the first, right up to the last one. When the membranes are broken, the embryo is released from its bonds and emerges from the womb all

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bunched together. For nothing has any strength to hold it once the membranes fail, and when the membranes have carried away, the womb itself cannot hold the child back – in fact even the membranes in which the child is enwrapped are not fastened very strongly to the womb. Once the child is on its way, it forces a wide passage for itself through the womb, since the womb is resilient. It advances head first – that is the natural position, since its weight measured from above the navel is greater than it is below.

It is in its tenth month in the womb that it acquires an access of force sufficient to rupture the membranes, and that is when the mother gives birth. If however the child suffers from some violent injury, the membranes are ruptured and it emerges earlier than the appointed time. Another case in which the mother may give birth to her child earlier than the tenth month is when the nutriment coming from the mother to the child gives out sooner than that time. But those women who imagine that they have been pregnant longer than ten months – a thing I have heard them say more than once – are quite mistaken. This is how their mistake arises: it can happen that the womb becomes inflated and swells as the result of flatulence from the stomach, and the woman of course thinks that she is pregnant. And if besides her menses do not appear but collect in the womb, and there is a continuous flow into the womb (accompanied sometimes by the gas from the stomach while sometimes the menstrual blood grows heated as well),* then she is especially likely to imagine she is pregnant. After all, her menstruation has ceased and her belly is swollen. Then it sometimes happens that the menses break forth either spontaneously or because a further flow into the womb carries down with it what was already there; the wind is discharged; and in many cases immediately after the loss of the menses the womb gapes and is turned down towards the vagina. Now if they have intercourse with their husbands then, they conceive on the same day or a few days afterwards. Women who are inexperienced in these facts and their reasons then reckon their pregnancy to include the time when their menses did not

* The text and meaning of this passage are doubtful.

flow and their wombs were swollen. But in fact it is impossible for pregnancy to last longer than ten months, and I shall explain why.

The nutriment for growth which the mother's body provides is no longer sufficient for the child after ten months are up and it is fully grown. It is nurtured by drawing the sweetest part of the blood towards itself, although it is fed to some extent from the milk as well. Once these are no longer sufficient and the child is already big, in its desire for more nutriment than is there it tosses about and so ruptures the membranes. This occurs more frequently in women who are bearing their first child: with them, the supply of nutriment for the child tends to give out before the ten months are up. This is the reason: the menstrual flow of some women is sufficiently abundant, while with other women the flow is less. (If this is always the case, it is the result of the constitution which she has inherited from her mother.) Now it is the women whose menses are small in quantity who also provide their infants with insufficient nutriment towards the end of their term when the infant is already large, and so cause it to toss about and bring on birth before ten months are up. The reason is their small flow of blood. Usually too these women cannot give milk: this is because they have a dry constitution and their flesh is densely packed. My assertion then is that what brings on birth is a failure in food supply (excepting cases of actual injury). My evidence for this is as follows: consider the way in which a chicken develops from the yolk of the egg. The egg is made warm by the sitting of the hen, and its content is set in motion by the same cause. Now through being heated the content of the egg acquires breath, and then a second quantity of cold breath from the surrounding air, through the shell – the egg-shell is porous, allowing sufficient air to be drawn through it for what is contained in the egg. The chicken grows inside the egg and becomes articulated in approximately the same way as the child, as I have already said. Now the chicken itself originates from the yolk, but it gets its nutriment and increase from the white – a fact which is quite obvious to anyone who has studied the matter. When the supply of

nutriment from the egg gives out, then not having enough to live on, it looks for more and moves about violently in the shell, and ruptures the membranes. When the hen notices the violent motion of the chick, she pecks at the shell and hatches it: this is on the twentieth day. It is clear that this is what happens, because when the hen breaks open the egg-shell there is practically no fluid left inside: it has all been used up by the chicken. It is the same with the child: once it has reached a certain size and its mother can no longer provide enough nutriment, in its search for more nutriment the infant tosses about until it ruptures the membranes, and being released in this way it emerges all at once. This occurs within a maximum of ten months. By the same principle animals both domestic and wild give birth at the proper time for each species, and no later: for there must necessarily be a definite time for every species of animal, at which the food supply becomes insufficient for the embryo and then gives out, and the animal gives birth. Those which have a smaller amount of nutriment for their embryos give birth earlier, while those which have a larger amount, later. So much, then, on that subject.

Once the membranes are ruptured, if the infant's momentum is in the direction of the head, the birth is easy for the mother. But if it comes sideways or feet first (this happens if its momentum inclines it in this direction, either because the size of the womb has given it space to move or because the mother has not kept still at the beginning of her birth-pangs) the birth is difficult and often fatal, either to the mother or to the child or both. In childbirth it is the women who are having their first child who suffer the most, because they have had no experience of the pain; apart from the general discomfort of the body, they suffer most in the loins and the hips, because these become distended. Those who have more experience of bearing children suffer less; much less, if they have had a large number of children.

If the embryo moves in the direction of the head, the head is first to emerge, followed by the limbs, with the umbilical

cord, to which the chorion* is attached, coming last of all. After all these comes a bloody serum, which is secreted from the head and the rest of the body in consequence of violence, pain and heat. This serum opens up a way for the purging of the lochia: the lochia follow the serum and flow for the period already stated. The lochial discharge empties the veins, and in consequence of this the breasts collapse, along with those other parts of the body which contain much fluid. This occurs to the least extent after the birth of the first child, but subsequently to a greater extent, after more children have been born. So much, then, on that subject.

31. Twins are produced from one act of intercourse. The womb contains a number of crooked pouches, at varying distances from the vagina. Animals which produce large litters have a greater number of these pouches than those which give birth to small litters, and this is true of animals both domestic and wild, and birds. Now when it happens that the sperm on its arrival in the womb is divided into two pouches, neither of which releases it into the other, then each of these separate portions in each pouch forms a membrane and comes alive in just the same way as I have said the undivided seed does. The evidence that it is from one act of intercourse that twins are born is given by the dog, the pig, and other animals which produce two or more offspring from one act of intercourse; each separate embryo in the womb is contained in its pouch, with its own membrane – this is a matter of common observation – and these animals generally produce all their offspring on the one day. In the same way, when a woman has twins as the result of one intercourse, each is contained in its own pouch and has its own chorion, and she bears both of them on the same day, one emerging first, and then the other, each with its chorion.

As for the fact that twins are born of which one is male, the other female, I maintain that in every man and in every woman – in fact in every animal – there exist both weaker and stronger varieties of sperm. Now the sperm does not come all at once:

*For the author's definition of *chorion*, see chapter 16.

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it comes out in two or three successive spasms. It is not possible that the first and the last lot should always be of even strength. The pouch which receives thicker and stronger sperm will contain a male, while that which receives sperm which is more fluid and weaker will contain a female. If strong sperm enters both, both will contain male offspring; if the sperm is weak, then both will contain female offspring.

With that I bring my whole account to its end.

THE HEART*

This short treatise is almost certainly a good deal later than most of the other works in the Hippocratic Corpus, the most commonly accepted view being that it belongs to a period approximately contemporary with, or slightly later than, Erasistratus of Ceos, who was active around 260 B.C. It is included in this selection as the outstanding work dealing with an anatomical subject in the Hippocratic Collection. It is the first extant treatise to mention the valves of the heart.

1. In shape the heart is like a pyramid, in colour a deep crimson. It is enveloped in a smooth membrane. In this membrane there is a small quantity of fluid, rather like urine, giving one the impression that the heart moves in a kind of bladder. The purpose of the fluid is to protect the pulsation of the heart, but there is just about sufficient of it to alleviate the heat of the heart as well. The heart filters out this fluid after it has received it and made use of it, drinking it up from the lung.

2. Now when a man drinks, most of it goes to the belly (the gullet being a sort of funnel which catches the greatest part of all that we ingest) but some of it goes into the larynx as well. The amount is, however, very small – not sufficient for us to feel it forcing its way in through the pressure of the current; for the epiglottis is a precisely fitting lid, and will not allow anything more than drink to get past. Here is the proof: take some water, colour it with blue copper carbonate or red ochre and give it to an animal which is almost dying of thirst (a pig is best, since this animal is neither cautious in its feeding habits nor refined in its manners). While the animal is still drinking, cut its throat.† You will find that it is stained with

*The printed texts of *de Corde* are all more or less unsatisfactory. For the most part the text of F. C. Unger has been used (*Mnemosyne*, 51 (1923), pp. 50ff.); this differs considerably from that of Littré. The translation and interpretation of some passages have been discussed in I. M. Lonie, *Medical History*, vol. 17 (1973), pp. 1–15, 136–53.

† Presumably the author means the windpipe.

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what the animal has drunk. The operation however is one which requires uncommon skill. We need have no doubts then when we say that drink has an effect, and a beneficial one, upon the larynx. Why is it then that when water rushes in impetuously it inconveniences us and provokes an acute fit of coughing? Because, I say, its course is then contrary to that of the breath; but the liquid which flows in as a result of pressure passes down the side of the larynx and hence does not oppose the upward passage of breath. Quite the contrary, in fact: by moistening the larynx it provides a smooth passage for the air.

3. The heart draws this fluid from the lung along with the air. But while it must necessarily expel the air once this has performed its service, by the route by which it drew it in, it allows some of the fluid to dribble into its sheath, letting the rest pass out along with the air. In this way too the breath, when it runs back, raises the palate. Of course the breath must run back in due course, since it is not food — how could mere air and water be food for man? They are rather a compensation for an innate deficiency.

4. But to return to my subject, the heart. The heart is an exceedingly strong muscle — ‘muscle’ in the sense not of ‘tendon’ but of a compressed mass of flesh. It contains in one circumference two separate cavities, one here, the other there. These cavities are quite dissimilar: the one on the right side lies face downwards, fitting closely against the other. By ‘right’ I mean of course the right of the left side, since it is on the left side that the whole heart has its seat. Furthermore this chamber is very spacious, and much more hollow than the other. It does not extend to the extremity of the heart, but leaves the apex solid, being as it were stitched on outside.*

5. The other cavity lies somewhat lower, and extends towards the line of the left nipple, which in fact is where its pulsation is observed. It has a thick surrounding wall, and is hollowed out inside to a cavity like that of a mortar. It is enwrapped and cushioned in the lung, and being surrounded

* He visualizes the right ventricle as enfolding the left: see ch. 9.

THE HEART

by it, it controls and tempers its own heat. For the lung is both cold in itself and is also cooled by respiration.

6. The inside surface of both chambers is rough, as though slightly corroded; the left more so than the right, for the innate heat is not situated in the right. It is therefore quite to be expected that the left chamber should be rougher than the right, being filled as it is with untempered heat. Hence it is of such massive construction – to protect it against the strength of the heat.

7. The orifices of the cavities are not exposed until one cuts off the tops of the ears* and removes the head [i.e. the base] from the heart. Once they are cut off, a pair of orifices for the two chambers is revealed. For the thick vein, running up from one, escapes our eye unless we dissect.†

These are the springs of man's existence: from them spread throughout his body those rivers with which his mortal habitation is irrigated, those rivers which bring life to man as well, for if ever they dry up, then man dies.

8. Close by the origin of the blood-vessels certain soft and cavernous [or 'porous'] bodies enfold the heart. Although they are called 'ears' they are not perforated as ears are, nor do they hear any sound. They are in fact the instruments by which nature catches the air – the creation, as I believe, of an excellent craftsman, who seeing that the heart would be a solid thing owing to the density of its material, and in consequence would have no attractive power, he equipped it with bellows, as smiths do their furnaces, with which the heart controls its

*By 'ears' the author evidently means the auricles along with the atria, since he does not otherwise refer to the atria. See note on p. 353.

†The text of these two sentences is dubious and the meaning is ambiguous. It is not clear whether two orifices are meant, or four; and the remark about the 'thick vein' is obscure. The problem is discussed in I. M. Lonie, op. cit. Dissection reveals four orifices, which are the sites of the four valves of the heart. The 'thick vein' is the *vena cava superior* and *inferior*, and the author's point is that before dissection the *vena cava* appears to be two veins, which would suggest that there are five main vessels, not four, leading from the heart; whereas dissection shows, in the author's opinion, that the *vena cava* is really one vein, whose common stock he takes to be the right atrium.

respiration. Here is the evidence for my statement: you can see the heart pulsing in its entirety, while the ears have a separate movement of their own as they inflate and collapse.

9. It is for this reason too that I maintain that while inspiration into the left cavity is effected through the veins, in the right cavity it is effected through an artery; for vessels which are soft have more attractive power, being more capable of distension. Now there was a need for that part of the heart which enfolds it like a cloak to receive less cooling, for it is not on the right side that the heat is situated. Hence it received an organ which would be favourable to this defect, to prevent it from being entirely overcome by the air entering it.*

10. The rest of my account will be concerned with the hidden membranes of the heart – a piece of craftsmanship deserving description above all others. There are membranes in the cavities, and fibres as well, spread out like cobwebs through the chambers of the heart and surrounding the orifices on all sides and emplanting filaments into the solid wall of the heart.† In my opinion these serve as the guy-ropes and stays of the heart and its vessels, and as foundation to the arteries. Now there is a pair of these arteries, and on the entrance of each three membranes have been contrived, with their edges rounded to the approximate extent of a semicircle. When they come together it is wonderful to see how precisely they close off the entrance to the arteries. And if someone who fully understands their original arrangement removes the heart from a cadaver and while propping up one membrane he leans the other against it he will find that neither water nor

* This whole passage has been convincingly emended in Unger's text which, with one alteration, is what has been translated. What the author somewhat obscurely means is that the heart draws air from the lungs into both ventricles, into the left through the pulmonary vein, and into the right through the pulmonary artery. But the right ventricle, having no 'innate heat' of its own, requires only a very small amount of air: hence it is equipped with the thicker-walled artery (evidently the semilunar valves on the pulmonary artery, which in chapter 10 are said to fit less precisely than those on the aorta, admit the passage of air).

† The author seems to recognize the *cordae tendineae* with the *musculi papillares*, and the *trabeculae carneae*.

THE HEART

air can be forced into the heart. This is especially true in the case of the membranes in the left chamber, which are engineered more precisely.

This is what one would expect: for man's intelligence, the principle which rules over the rest of the soul, is situated in the left chamber.

11. Its nutriment is neither the solid food nor the drink which comes from the belly, but a pure and luminous substance which is refined out of the blood. It conveys this nutriment out of the neighbouring blood receptacle by transmitting its rays, deriving it from there as though from the belly and intestines, which of course it does not do in reality. Now to avoid any disturbance from the confused movement of the food in the great artery [i.e. the aorta], it closes off the passage to that artery. For the great artery feeds from the belly and intestines and is laden with food not fit for the ruling principle.

It is obvious that the left cavity is not nourished by visible blood: if you kill an animal by cutting its throat and open up the left chamber, you will find it quite empty apart from some serum and bile, and the membranes which I have described. But the artery will not be empty of blood, nor the right chamber. This, then, as I see it, is the reason for the membranes on this vessel.

12. As for the vessel which comes from the right chamber, this too is closed off by the membranes meeting together. But they are too weak to close it completely. It opens towards the lung to provide blood for the lung's nutriment, while towards the heart it is closed, but not hermetically, so that air can enter it, though only in a very small quantity. For in this part the heat is weak, being dominated by a mixture of cold. Contrary to the general opinion, blood is in fact not a hot thing by nature, any more than any other fluid; though it may be made hot.

Such, then, is my description of the heart.

NOTE ON THE TRANSLATION OF SOME HIPPOCRATIC TERMS IN *THE NATURE OF THE CHILD AND THE HEART*

Pbleps, plural *phlebes*. In Greek medical writers this word generally means 'blood-vessel', which includes both the vein and the artery of modern anatomy. After the distinction had been made, *pbleps* approximated to the sense in which the modern anatomist uses 'vein'. Yet even the author of *The Heart*, who is aware of the distinction, in one passage (ch. 8) uses *pbleps* in its general sense, and I have translated 'blood-vessels' accordingly. There is no difficulty here. However, in *The Nature of the Child*, *phleps* is used for the author's peculiar hypothesis that the body is a network of communicating vessels which convey all sorts of fluid: sperm, milk, the 'humours', as well as blood. 'Blood-vessel' would be a misleading translation here, since it would carry the implication that the physiological processes described are abnormal. In fact *phleps* for this author simply means any vessel in the body which conveys fluid. I have therefore preferred the translation 'vein' to 'blood-vessel', which has the further advantage that 'vein' may also be applied to porosities in other substances, e.g. the 'veins' in plants, and in fact the author of this treatise uses *phleps* in this way.

Neuron, plural *neura*. There is a similar difficulty with this word, which cannot simply be translated as 'nerve,' since before the discovery of the nervous system the word was much more likely to signify what we should call tendons and ligaments. Yet it may also refer, anatomically if not physiologically, to what the modern anatomist would recognize as nerves. Since English has no word which covers all three meanings, it is not possible to give a consistent translation here. Hence the same word is translated as 'ligaments' in chapter 2 of *The*

NOTE ON THE TRANSLATION

Seed and as ‘nerves’ in chapter 19 of *The Nature of the Child*.

Ous, plural *ōta*, and *gastēr*, plural *gasteres*. Literally ‘ear’ and ‘belly’. In *The Heart* it is tempting to translate these as ‘auricle’ and ‘ventricle’ respectively, since the words contain the metaphor from which the modern terminology originated. But ‘auricle’ would be definitely misleading, since the author clearly includes in the ‘ears’ of the heart the atria, while ‘ventricle’ implies the modern distinction between ventricle and atrium. ‘Cavity’ seemed a safer translation here.

Dynamis, plural *dynamēis*. This word, which signifies a concept or range of concepts integral to Greek science, is notoriously difficult to translate. In general it means ‘power’, but also ‘quality’, which in early Greek thought is not always distinguished from the thing or substance which possesses that quality. The author of *The Nature of the Child* abnormally extends this tendency when he uses *dynamis* to signify ‘substance of a particularly active character’. I have attempted to preserve this semantic anomaly by using the word ‘potency’: it should be clear from the context that the author means a substance. The closest translation would be the word ‘virtue’ in its archaic use: Chaucer’s

And bathed every veyne in swich licour
Of which vertu engendred is the flour*

conveys the author’s idea exactly. ‘Vertu’ is of course Latin *virtus*, which was the standard translation of Greek *dynamis*. The passage from Chaucer is particularly apt, since it equates ‘licour’ with ‘vertu’, just as the author of *The Nature of the Child* equates his ‘potency’ with the ‘moisture’ (*ikmas*) which is contained in the seed.

* Prologue to *The Canterbury Tales*, ll. 3-4.

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GLOSSARY OF NAMES*

- AETIUS OF AMIDA.** Sixth-century A.D. author of a sixteen-book medical encyclopedia.
- ALCMAEON OF CROTON.** *Fl. c. 450 B.C.* A natural philosopher interested also in medicine. He has been thought, on the basis of a report in Chalcidius, to have been one of the first Greeks to have attempted dissection.
- ALEXANDER OF TRALLES.** Sixth-century A.D. medical encyclopedist. His treatise in twelve books is extant.
- ANAXAGORAS OF CLAZOMENAE.** *c. 500-c. 428 B.C.* A natural philosopher who worked mainly in Athens; teacher and friend of Pericles.
- ARISTOTLE OF STAGIRA.** *384-322 B.C.* The most important of the extant works from the point of view of the medical sciences are the zoological treatises, especially *De Generatione Animalium*. He refers, in his psychological treatises, to a discussion *On Health and Disease*, though this work is not extant.
- CAELIUS AURELIANUS.** Fifth-century A.D. medical writer. His *Acute Diseases* (three books) and *Chronic Diseases* (five books) are thought to be largely derived from works of Soranus (q.v.).
- CASSIODORUS.** Sixth-century A.D. historian and (through his *Institutions*) influential educationalist.
- CELSUS.** First-century A.D. encyclopedist. His *On Medicine* (in eight books) is the only part of his six-part encyclopedia that is extant.
- DEMOCEDES OF CROTON.** *Fl. c. 525 B.C.* According to Herodotus (III, 129 ff.) one of the most famous doctors of his day, being, at different times, physician to Polycrates of Samos and (while a prisoner in Susa) to Darius.
- DEMOCRITUS OF ABDERA.** *c. 460-c. 370 B.C.* According to Diogenes Laertius he composed several works on medical topics. He is chiefly famous for having developed the atomic theory originally suggested a little earlier by Leucippus. Since none of Democritus' treatises is extant, this has to be reconstructed from fragments and references in Aristotle and other sources.
- EMPEDOCLES OF ACRAGAS.** *Fl. c. 445 B.C.* Author of a cosmo-

* Including Greek and Latin medical writers important for the understanding of Hippocratic writings and their influence.

GLOSSARY OF NAMES

logical poem *On Nature* (which sets out the theory of the four physical elements, earth, water, air and fire) and of a religious poem the *Purifications*, fragments of both of which are extant. He is described by Galen as belonging to the Italian school of medicine. Yet references to the 'word of healing' in a quasi-mystical context in the *Purifications* suggest that his medicine may have been of the type criticized by the author of the Hippocratic work *The Sacred Disease*.

ERASISTRATUS OF CEOS. Fl. c. 260 B.C. Famous physician, anatomist and physiologist. His works (all lost) are frequently cited and criticized by Galen who ascribes to him (for example) the discovery of the valves of the heart. According to Celsus (q.v.) he and Herophilus practised dissection and vivisection on humans.

GALEN OF PERGAMUM. A.D. 129-c. 210. An outstanding physician, anatomist and physiologist, he also wrote extensively on non-medical subjects, for example logic. Many of his medical and biological treatises, including thirteen of his commentaries on Hippocratic works, are extant.

HEROPHILUS OF CHALCEDON. Fl. c. 270 B.C. Famous physician, anatomist and physiologist who (like Erasistratus, q.v.) is reported to have dissected and vivisected human subjects. He made many anatomical discoveries and developed the first systematic theory concerning the use of the pulse in diagnosis.

HIPPOCRATES OF COS. The traditional date of his birth is 460 B.C. He is mentioned by Plato, Aristotle and Meno (q.v.) but he cannot be identified with certainty as the author of any one of the Hippocratic treatises.

ISIDORE OF SEVILLE. Fl. c. A.D. 600. Historian and encyclopedist; among the extant works are the *On the Nature of Things* and the *Etymologies*, both of which allude briefly to medical matters.

MACROBIUS. Fifth-century A.D. author of the influential *Commentary on the Dream of Scipio* and the popular miscellany the *Saturnalia*.

MELISSUS OF SAMOS. Fl. c. 440 B.C. Followed Parmenides (q.v.) in denying change and plurality. Mentioned in the Hippocratic work *The Nature of Man*.

MENO. Pupil of Aristotle. He wrote a history of medicine at the end of the fourth century B.C., excerpts from which are preserved in the papyrus *Anonymus Londinensis*.

ORIBASIU OF PERGAMUM. Fl. A.D. 360. Some twenty-five books of his seventy-book medical encyclopedia, the *Medical Collections*, largely based on Galen, are extant.

GLOSSARY OF NAMES

PARMENIDES OF ELEA. Philosopher born c. 515 B.C. His denial of change and plurality and his rejection of sensation in preference for reason influenced both later fifth-century B.C. natural philosophy and Plato profoundly.

PAUL OF AEGINA. Seventh-century A.D. medical encyclopedist. His general medical treatise in seven books is extant.

PHILISTION. Fourth-century B.C. medical writer whose theories are reported in *Anonymus Londinensis*. He is referred to in Plato's Second Letter and is thought to have influenced the medical doctrines that Plato included in the *Timaeus*. He is mentioned by Galen as one of the authors to whom the Hippocratic works *Regimen* and *A Regimen for Health* were attributed.

PHILOLAUS OF CROTON. Fl. c. 410 B.C. Pythagorean cosmologist, astronomer, mathematician and medical theorist: his medical and physiological doctrines are reported in *Anonymus Londinensis*.

PLATO OF ATHENS. 428–347 B.C. Influential both for his epistemological views and for the teleological cosmology (which includes a detailed theory of diseases) in the *Timaeus*.

POLYBUS. Fl. fourth century B.C. Son-in-law of Hippocrates and probable author of *The Nature of Man* in the Hippocratic collection.

PRAXAGORAS OF COS. Fl. c. 300 B.C. Physician and medical theorist, the discoverer of the diagnostic value of the pulse.

RUFUS OF EPHESUS. Fl. c. A.D. 100. Medical writer. The principal work of his that is extant is his *On the Naming of the Parts of Man*.

SORANUS OF EPHESUS. Physician who worked about 120 A.D. The most important work that is extant is his treatise in four books on gynaecology. A Life of Hippocrates is also attributed to him.

THEOPHILUS PROTOSPATIARIUS. Seventh-century A.D. medical writer, several of whose works (such as the *On the Construction of the Human Body*, based largely on Galen) are extant.

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SUPPLEMENTARY INDEX TO MEDICAL TREATISES

This index lists certain morbid conditions which, although not necessarily mentioned by name in the text, are certainly, probably or possibly described therein. It must be realized that an index of this kind, depending on interpretation and sometimes reasonable guesswork, must be liable to a good deal of error; nevertheless it may add some interest for the modern student who may look up such subjects as *mumps* or *diphtheria* or the *inheritance of acquired characteristics* and find something about these subjects in the text. The index should be used in conjunction with the General Index. Where a cross reference is marked with an asterisk (*) the subject will be found in the General Index. Textual references are printed in italic type, page numbers in roman.

The following abbreviations are used:

<i>TM</i>	<i>Tradition in Medicine</i>
<i>E(I)</i>	<i>Epidemics</i> , book I
<i>E(III)</i>	<i>Epidemics</i> , book III
<i>SM</i>	<i>The Science of Medicine</i>
<i>AWP</i>	<i>Airs, Waters, Places</i>
<i>P</i>	<i>Prognosis</i>
<i>A</i>	<i>Aphorisms</i>
<i>SD</i>	<i>The Sacred Disease</i>

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