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A

MANUAL OF DIET

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A MANUAL

OF

DIET IN HEALTH AND DISEASE,

BY

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PREFACE.

The aims of this Handbook are purely practical, and therefore it has not been thought right to increase its size by the addition of the chemical, botanical, and industrial learning which rapidly collects round the nucleus of every article interesting as an eatable. Space has been thus gained for a full discussion of many matters connecting food and drink with the daily current of social life, which the position of the Author as a practising physician has led him to believe highly important to the present and future of our race.

Thos. K. Chambers.

24 Mount Street, Grosvenor Square:
January 1, 1875.

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PART I.

GENERAL DIETETICS.

CHAPTER I.

THEORIES OF DIETETICS.

WHAT is the natural food of man?

Each animal in a state of nature finds substances suited for its nutrition ready to hand, and within the grasp of the instruments he possesses for their acquisition. And these substances seem, generally, the most proper to sustain the health and strength. So that it has been not irrationally argued, that it would be a useful act of scientific reasoning to infer from the structure of the human organs what kind of food they are most fitted to appropriate, for this would probably prove most conducive to physical well-being.

When, in pursuit of this reasoning, we come to compare man's form with that of other mammalia, his prehensile organs—his teeth, his jaws, and his feet and his nails—do not seem to fit him for grappling with any of the difficulties which the adoption of special kinds of food prepared by nature entails. He can neither tear his prey conveniently, nor crack many nuts, nor grub roots, nor graze. His digestive viscera, in middle life, are too bulky and heavy to qualify him for the rapid movements of the carnivora; and they are not long enough to extract nourishment from raw vegetables. To judge by form and structure, alone, the natural food of an adult man must be pronounced to be *nothing*.

On the other hand, if we read the laws of man's nature by the light of the general consent of the individuals of his race,

which is the wisest course,[1] we shall arrive at the opposite conclusion, that his food is *everything* which any other warm-blooded animal can use as nourishment. If we try to construct a universal dietary from the records which each new traveller brings home of what he has beheld habitually eaten, we shall find very few forms of organic matter, capable of supporting mammalian life, which are not appropriated by man also to his own use. By selection and preparation he contrives to remove such parts and such qualities of the substances presented by nature as are noxious to him, and to improve such as suit his purpose; so that as finally swallowed, they are more wholesome to him than to the beasts who eat nothing else. These lists of possible eatables are most interesting to the student of human nature; they lead to inferences as to the action of laws, religions, customs, and associations, in making that abominable to one race which is most highly appreciated by another, and they are an important part of the arguments of those who trace political events and national character to physical causes; but they are not suited to the present volume, which will concern itself with the action on individual health of food generally accessible in the British market. Reference may be occasionally made to a more extended *materia alimentaria*, but it can contribute little to the main arguments proposed.

The power by virtue of which man becomes so truly omnivorous is Habit. He can gradually, in time, accustom himself to live on anything containing nourishment, provided he be not limited in quantity, nor restricted in facilities for preparation. The inferior animals could do the same if they only knew how to set about it; for when we bring our reason to bear on their lives, we can effect what at first sight seem most radical changes in their nature, in respect of food; and we can even induce and perpetuate hereditary forms of body suited to the altered circumstances we have brought about.

[1] 'Consensus omnium nationum lex naturæ putanda est.'—Cicero *de Legibus*, i. 8.

Spallanzani found that pigeons may be fed on flesh, and eagles on bread, by accustoming them to it; the domestic dog grows strong on biscuit, and often suffers in health on being brought back to his native food; our poultry is more robust, more fertile, and apparently happier, for being supplied with meat, fat, or soup, and our cats have accommodated themselves to a mixed diet, assimilating their form to that of herbivora, by a considerable increase in the length of their bowels over those owned by their cousins of the mountains. The speechless creatures have not the wits to acquire unaided these new powers, compulsory education is necessary; even for such a simple process as learning to eat turnips, the lamb requires a shepherd to stand over him and forcibly make him chew. Man's chief bodily strength depends on his willingness to submit to the pain of acquiring habits, and on his forcing his domestic stock to submit to it, for the sake of a future advantage.

The solvent actions of the juices of the intestinal canal on food seem to be the same in quality in all classes of animals, and to admit of modification in the proportions of their ingredients according to the diet adopted. Under vegetable food the saliva becomes more copious, under meat there is more gastric juice. The bile of a grazing ox is more watery than that of a man; the bile of a growing boy (who can digest any amount of meat) was found by Gorup-Besanez[1] to contain nearly double the amount of solid contained in that of an old woman (whose age would dispose her to be very little carnivorous).

This shows the importance of what may be called the preparatory or mechanical parts of digestion. The digestive solvents can evidently grow equal to all emergencies of the chemical acts required of them, and the differences in the results of those acts must mainly hang on the mechanical condition of the substances presented to them. Fortunate

[1] *Untersuchungen über d. Galle*, Erlangen, 1846. The relative proportions of solid matter were 17·19 per cent. as against 9·13 per cent.

indeed is it that such is the case, for the mechanical condition of the food is certainly more fully in our power, and more easily influenced by our reason, than the chemical solvency of the secretions. We can choose, according to its hardness, softness, and other external qualities, the sort of victual we put in our mouths; we can prepare it with art, can regulate its bulk and the period of taking it; while the muscles which chew it and swallow it are almost entirely under our direction. But it is only very indirectly that we can influence the saliva, the gastric and pancreatic juices, and the bile.

Assuming, then, that man can easily accommodate himself to a varied and mixed diet—that he has, as a matter of fact, accommodated himself to it—and that, therefore, it will in future, as in the past, best suit his requirements—the next point of interest is the proportion which its several ingredients should bear to one another.

Physiologists have pointed out that in the preparation made for the infant at its entrance into life, and which is a striking instance to the faithful mind of a controlling design in creation, we have a typical instance of what the All-wise considered a suitable dietary. Looking to its qualitative composition, we find milk contains alimentary principles capable of separating themselves, and, in fact, habitually separated for economical purposes, somewhat in the following proportions:—

Water	88 per cent.
Oleaginous matter (cream, butter) . . .	3 „
Nitrogenous matter (cheese and albumen) .	4 „
Hydrocarbon (sugar)	4½ „
Saline matter (phosphate of lime, chloride of sodium, iron, &c.)	½ „

This rough average is the best way of stating the facts for physiological purposes; since, as every mother, physician, and farmer knows, the proportions vary considerably in different specimens of even the same species of animal, and are influenced by differences in the mode of living. The argument is, that there, or thereabouts, may be found the ratio which there

should be in our dietary, in the amounts of the alimentary substances of which the above may be taken as representatives. That is to say that, supposing a man to consume 200 ozs. of victual daily, the contents should be about—

6 quarts of water,
½ a lb. of animal matter, such as cheese, or lean meat, or eggs,
6 ozs. of fat, oil, or butter,
9 ozs. of sugar or starch,
1 oz. of salt, and some small quantity of bone or iron.

A serious flaw in this argument is that while the dietary is prepared for, and truly suits very well, the newly born, we have no evidence that either it is intended for, or would suit better than another, the adult. The milk of our domestic animals so closely resembles that which supported us in infancy, that if we carried the reasoning out to its logical consequences, we should all be feeding together now at the same manger. If the milk represents what the adult ought to make its diet, our bull would require only a little more butter, and our horse only a little less than we do; our goat would want one-third more meaty or nitrogenous matter to be contained in the food than ourselves; and the dog would require five times the proportion of flesh that is laid on his master's table to be afforded him.[1] In point of fact, the life led by the young of all animals

[1] The computation of the ingredients of milk is a deduction from the following table of M. Boussingault's analysis:—

Milk of	Water per cent.	Caseine and Albumen.	Butter.	Sugar of Milk.	Salts.
Woman . .	88·9	3·9	2·6	4·3	0·1
Cow . . .	86·6	4·0	4·0	4·8	0·6
Ass . . .	90·3	1·9	1·0	6·4	0·4
Mare . . .	90·9	3·3	1·2	4·3	0·5
Goat . . .	84·9	6·0	4·2	4·4	0·5
Sheep . . .	86·5	4·5	4·2	5·0	0·7
Dog . . .	77·9	15·8	5·1	4·1	1·0

is much the same, whereas in adult age they differ widely in their occupations, and in the demand for the sort of viands best adapted to those occupations.

There is greater promise of profit to the dietician in a calculation of the outgoings of matters resulting from the wear and tear of the body, reducing these to ultimate elementary substances, and thus ascertaining in what proportion to one another new supplies of ultimate elementary substances are required, merely to replace those consumed. It is obvious that the food which supplies the demand most accurately will be the most economical in the highest sense. We can measure, for example, the carbon and the nitrogen daily thrown off in the excretions, and then lay down a rule for the minimum quantity of those elements which the daily food must contain to keep up the standard weight. If the diet is such as to make it necessary to eat too much carbon in order to secure a due amount of nitrogen, there is an obvious waste, and the digestive viscera are burdened with a useless load. The same reckoning can be applied to the lime, sulphur, phosphorus, oxygen, and hydrogen, which go towards building up and renewing the tissues of the body. The dietary must contain these, or the body must waste away by the unstayed drain of destructive assimilation; and if it contains any notable excess, not only is it uneconomical, but may be pernicious to the health.

Suppose, for instance, a gang of a hundred average prisoners to excrete in the shape of breathed air, urine, and fæces, daily 71½ lbs. of carbon and 4¼ lbs. of nitrogen, which is pretty nearly the actual amount of those elements contained in the dried solids of the secretions, as estimated in current physiological works. Nitrogen and carbon to that extent, at least, must be both supplied. Now, if you fed them on bread and water alone, it would require at least 380 lbs. of bread daily to keep them alive for long; for it takes that weight to yield the 4¼ lbs. of nitrogen daily excreted. But in 380½ lbs.

of bread there are 128½ lbs. of carbon, which is 57 lbs. above the needful quantity of that substance.[1]

If, on the other hand, you replaced the bread by a purely animal diet, you would have to find 354 lbs. of lean meat in order to give them the needful 71½ lbs. of carbon; and thus there would be wasted 105 lbs. of nitrogen which is contained in the meat, over and above the 4¼ lbs. really required to prevent loss of weight.[2]

In the former case, each man would be eating about 4 lbs. of bread, in the latter, 3½ lbs. of meat *per diem*. If he ate less, he would lose his strength. In the former case, there would be a quantity of starch, and in the latter, a quantity of albuminous matter, which would not be wanted for nutrition, and would burden the system with a useless mass very liable to decompose and become noxious.

Now, if a mixed dietary be adopted, 200 lbs. of bread with 56 lbs. of meat would supply all that is required. Besides water,

200 lbs. of bread contains . .	60 of carbon . .	2 of nitrogen
60 „ meat (including 12½ lbs. of fat upon it)	12 „ . .	2¼ „
	72	4¼

Judged by the above standard, it will be clearly seen that milk does not represent a typical diet for an adult population, the nitrogenous matter being in considerable excess in proportion to the carbonaceous. This is suitable to the young animal, whose main duty consists in growing, that is in appropriating an excess of nitrogenous matter to form an addition to the body daily, but not to the full-grown, who has to develope

[1] Dr. Letheby's Analysis gives 8·1 per cent. of nitrogenous matter to bread (*Lectures on Food*, p. 6). Of this ⅐ is nitrogen; Boussingault's analysis of gluten giving 14·60 per cent. (*Ann. de Chim. et Phys.* lxiii. 229). M. Payen makes the proportion of carbon to nitrogen in bread as 30 to 1.

[2] The proportion of nitrogen to carbon in albumen is as 1 to 3½ (15·5 to 53·5 by Mulder's analysis, quoted in Lehmann's *Phys. Chemie*, i. 343). In red meat there is 74 per cent. of water (ditto, iii. 96).

force, or its equivalent, heat, by the combustion of carbon, and had rather not go on growing.

Calculations such as these, applied to the other numerous, though less bulky constituents of the body, are invaluable. They afford a basis for the administration of food-supply to armies, navies, prisons, and other bodies of men dependent upon us; they enable us to detect the causes of wasteful expenditure, and to distribute limited means in an economical fashion. They tell us why nations which, voluntarily or involuntarily, become dependent on one kind of food for subsistence can never be wealthy, for they devour and waste their substance; and they teach statesmen how to avoid those ruinous revolutions, which, as has been well observed, arise more often from want of food than from want of liberty.

But the calculations must always be open to the correction of continuous observation and experiment. Chemical analysis is much too young an art to be infallible, and hitherto undetected substances and conditions are, year by year, turning up, which modify our conclusions. And a very wide margin must be left for unforeseen contingencies, and a discretionary power be placed in the hands of individuals, or there is a risk lest the administrator should have to regret making too precise a reckoning. He whose income is only just equal to his expenditure, is always on the brink of insolvency.

The most important modification required to be made arises out of the differences of work demanded. Men may languish in solitary prisons, invalids may lie bedridden, paupers may wait for better times, nations may idle away existence, on a scale of food-supply which is followed by death from starvation when work is demanded. How shall the effect of physical exertion be reckoned? Here the engineers have helped us with their precise and irrefragable science. Joule of Manchester analyzed, about thirty years ago, the relation which the heat used in machinery, as a source of power, bore to the force of motion thus made active. He found means of proving, that raising the temperature of a pound of water one degree

Fahrenheit was exactly equivalent to raising 772 lbs. to the height of a foot. And, conversely, that the fall of 772 lbs. might be so applied as to heat a pound of water one degree Fahrenheit. Thus, the mechanical work represented in the lifting 772 lbs. a foot high, or one pound 772 ft. high, forms the 'dynamic equivalent,' the measure of the possible strength, of one degree of temperature as marked by the thermometer. Physiologists seized eagerly on the opportunity which Joule's demonstration seemed to afford them of estimating, in actual numerals, the relation of living bodies to the work they have to do. So much earth, raised on an embankment, represents so much heat developed in the machinery, living or dead, muscle or steel, gang of labourers or steam engine, which raised it. Both muscle and steel come equally under the great physical laws of the universe which the far-sighted mechanician has expounded. Now, in the animal frame, the supply of heat, and therefore the supply of capacity for work, is that which is developed from latency into energy by the chemical actions, the ceaseless round of unending change, which is an inseparable part of life. The amount of fully digested food, converted through several stages into gaseous, liquid, and solid excretory matters, produces by its chemical changes a definite amount of heat, of which a definite amount escapes, and a definite amount is employed in working the involuntary machinery of the body, and the rest is available for conversion at will into voluntary muscular action. As the mechanician allows for the effect of friction, &c., in making his calculations, so the physiologist allows for the action of diffusion, conduction, imperfect secretion, and so on, in reckoning the quantity of heat available, and allows also for the waste of mechanical power involved in the form and structure of the limbs. To make all these allowances necessitates courses of experiments and calculations which have taken more than a generation, and will probably take more than another generation to complete. But the road seems clear, and already we have gained fruitful information as to the sort

of food by which we can expect to get most work out of men and beasts; we have found the cause of many of our failures in distributing victuals; and we have learnt how to avoid much cruelty and injustice that our fathers unknowingly perpetrated.

It may be reckoned from experimental calculations, too long to be inserted here, that the expenditure of force in working the machinery of the body—in raising the diaphragm about fifteen times, and contracting the heart about sixty times, a minute; in continuously rolling the wave of the intestinal canal; and in various other involuntary and voluntary movements which cannot be avoided even by a mere cumberer of the ground, without doing anything that can be called work—it may be reckoned that the expenditure of force in doing this is equal to that which would raise a man of ten stone 10,000 ft. But a man cannot even pick oakum without expending more force and requiring more to support it. A prisoner on penal diet has half as much again.

There are several reasons for believing that in assigning their physiological functions to the several sorts of food, we should ascribe nearly all the business of giving birth to force to the solid hydrocarbons, starch and fat, by their conversion into carbonic acid, just as we have good grounds for thinking that it is the conversion of the solid hydrocarbon, coal, into carbonic acid, which drives our locomotives. It is not necessary to be acquainted with every step of the process, which, in the body, we confessedly are not, to appreciate the argument. To the nitrogenous aliments seems allotted the task of continuously replacing the wear and tear of the nitrogenous tissues. Flesh food, or that which comes near it in nitrogenous contents, after a few changes replaces the lost flesh which has passed away in excretions; and thus the engineer takes iron ore, makes it into wrought plates or steel, and renews the corroded boiler-plate or worn piston-rod. One of the most cogent of these reasons is that the chief nitrogen-holding excretion, the urea, is little, if at all, increased in quantity by

an increase in the work done: whereas the excretion of carbonic acid, in a decided manner, follows the amount of muscular exertion. Now it is very clear that if the supply of power to do work depended on the renewal by food of the nitrogenous tissues, and on their decomposition, the urea would have no escape from being largely augmented in quantity by muscular efforts, and diminished by rest. This is not the case. At first, exercise diminishes the amount of urea (Parkes), and, even when continued, very little increases it (E. Smith, Haughton and several others quoted in Parkes's 'Hygiene,' p. 383). The very small increase which takes place during the following rest may be attributed fairly to the extra wear of the muscles from extra motion, just as a steam engine is expected to require more repair than usual when in hard use. But that amount of repair demanded is as nothing, compared with the increase in the tonnage of coal consumed.

To give an example of the mode of working out a problem by this theory:—Dr. Frankland ascertains with the calorimeter, which calculates the amount of heat evolved as a thermometer does its degree, the quantity of energy or force, under the form of heat, evolved during the complete oxidation in the laboratory of a given weight of alimentary substance. It was explained before, that heat and mechanical work, being convertible into one another, bear an eternally sure proportion to one another: now, and for ever, a definite production of so much heat represents the potentiality of so much motion, used or wasted, according to circumstances. So that from the reading of the calorimeter may be reckoned how many extra pounds ought to be raised a foot high by a man who has eaten an extra pound of the food in question; how many steps a foot high he ought to raise himself (say a weight of ten stone) before he has worked out the value of his victuals. Dr. Frankland has thus estimated the comparative value of foods as bases of muscular exertion, and he has made out a table of the weight and cost of various articles that would require to be consumed in the system to enable a man of ten stone to

raise himself 10,000 ft. This is equal to going up a ladder two miles and one-third high—a stiff day's work. Three pounds and a half of lean beef at a cost of at least 3*s.* 6*d.* would be wanted; but if little more than half a pound of suet, worth about 5½*d.*, were substituted, the same effect might be elicited. A liberal three quarts of milk at 5*d.* a quart would do the same thing; but if cabbages or apples happened to be the only available food, 12 lbs. of the former or nearly 8 lbs. of the latter must be swallowed—an intolerable burden even for the *dura messorum ilia*. There is great wisdom, then, in the journeyman tailor who adds suet or bacon to his cabbage, and in the Yorkshireman who puts a slice of cheese in the apple-pie which often serves him for breakfast, dinner, and supper—for the said cheese is very high in the scale of nutrimentary fuel, and 10*d.* will buy as much of it as is equal to the 3½ lbs. of beef. But in wheaten bread we find a true friend, for of it two pounds and a third, costing under 5*d.*, supply a food which really might be eaten alone; whereas the consumption of the others as a sole diet is of course theoretical—the average digestive organs cannot bear them. The mere weight, for instance, of 12 lbs. of cabbage would knock a man up, if carried in a vessel so ill adapted to sustain heavy loads as the stomach.

Reverting now to the gang of a hundred prisoners formerly used as an illustration, and supposing we wanted to put them on hard labour involving some exertion equivalent to half Dr. Frankland's unit of ten stone raised 10,000 feet—such, for instance, as carrying 1⅙ mile, up ladders, three tons of stone daily—we should find by calculation that the addition of 117 lbs. of bread, or of 58 lbs. of bread with 44 lbs. of lean meat and 63 lbs. of potatoes, to that diet which would keep up their flesh, without labour, would be barely sufficient, and that they would lose a little weight daily. Cases of illness from overwork would be improperly frequent. Give them a draught of milk, or a cup of cocoa and sugar, or some oatmeal-porridge and treacle, or even some green vegetables, and the

danger is probably averted. But yet, a wide margin must be allowed for discretionary modification according to circumstances which the immediate administrators of victualling arrangements alone can observe.

Still more necessary is modification according to circumstances required, when we come to deal with individuals instead of masses. When the tailor in Laputa sternly refused to take the usual measurements, and insisted on constructing Captain Gulliver's coat, waistcoat, and breeches on abstract principles, the customer vowed it was the worst suit of clothes he ever had in his life. We should certainly fail in the same way if we did not take the measure of numberless contingencies in the daily life, and numberless peculiarities in the persons of those who consult us about their diet and regimen, or who are (like the inmates of prisons) actually dependent upon us for living at all.

Even healthy persons are not absolutely perfect in the performance of all their functions, and a good deal of the food swallowed escapes digestion and is wasted among the excreta. A considerable margin must be allowed for that. And different forms of food and different preparations of those forms are suited, from their mere mechanical construction, to different constitutions of body. A diet which in an old man may be wasted from lack of solution, and which would therefore be a starvation diet to him, may in a young man be richly ample. On the other hand, the easily soluble, but scanty diet on which the old man might flourish, would not suffice for his active, growing grandson. Then again, very different lives are necessarily led by different men, and even by the same man at various times, and variations in the mere quantity of food, at the instigation of appetite, are not sufficient to accommodate the diet to the work. Brain-work, body-work, in-door work, and out-door work, all introduce modifications in the daily requirements of the nutritive organs. There are also physiological drains upon the constitution, such as that felt by a nursing mother, and pathological drains, such

as that of a purulent discharge, which have to be provided for. And it must be remembered also that many morbid conditions, which yet do not keep a patient from his employment, such as gastric catarrh or tuberculosis, yet interfere with the due solution of the meals. And some, such as gout and diabetes, are aggravated by eatables which are wholesome to a healthy constitution. And there are hereditary tendencies which may be turned into diseases by popular articles of diet, and not a few idiosyncrasies to be allowed for.

With the safeguards of due allowance for the above elements of variation, and a close eye upon current experiment, the theory of demand and supply in dietetics may be turned to the very best account by rational medicine.

CHAPTER II.

ON THE CHOICE OF FOOD.

THERE is no rule capable of such universal application as that all articles designed for human food should be the best of their kind which can be procured, and that it is false economy to be tempted by a lower price to be satisfied with less eligible wares. The saving in money is always out-balanced by the inferior utility. Economy, when necessary, should be practised in quantity, not quality, in the sort of food chosen, and not in its degree of perfection.

As to the arrangement of the subject, the naturalist's classification has been that usually adopted by authors. But it seems to me less scientifically appropriate to the matter in hand, and more likely to involve repetition, than one which brings together articles associated in the market, and which, indeed, often combine elements derived from several realms of nature. These articles are here to be considered solely as food for man, and not as independent members in creation.

§ 1. BUTCHER'S MEAT.

The lean of butcher's meat should show a deep purplish red tint, with a sort of bloom over it, on the outside of the muscle, and a lighter vermilion red with a bare shade of purple in the cut surface. The lean of beef may be a little marbled with fat, but that of mutton should be quite even in hue. When cut in a very fine slice, or stretched in a thin layer over

the fat, as naturally, in the ribs, it is semi-transparent and orange-vermilion in uniform streaks.[1]

The surface is quite dry, and even the cut should scarce wet the finger. In substance it is moderately soft, but extremely elastic, so that no mark is left after pressure. A day or two in the larder should make no difference in this respect.

There is very little odour in a single joint of good meat, and what there is, to most people, is not unpleasant. When made powerful by accumulation, as in a shop, it may be described as refreshing and exhilarating, like a sea-breeze.

It should not waste much in cooking. That is to say, it should not contain an excess in water, nor part with it too easily. Dried in the laboratory, healthy muscular fibre, according to Dr. Letheby,[2] does not part with above 70 to 74 per cent. of its weight; whereas, when in an unhealthy condition, it will lose as much as 80 per cent. Cooking is, of course, not the complete chemical desiccation alluded to; but its relation to animal fibre is the same.

When a joint is brought to table roasted, it holds well its gravy, which gushes out when a cut is made, in a rich brown stream, full of appetizing scent and flavour, and called graphically by the chemist 'Osmazome.'

The tastes of the tissues should be quite distinct from one another. The mutton lean should have no flavour of tallow, nor the beef of suet. Tenderness, of course, is a virtue, but freshness should not be sacrificed to it.

The raw fat of beef, whose base is principally margarine, should be of a light yellow colour, like fresh butter; that of mutton, which is mainly stearine, should be very white.

Lamb and veal should have very white and translucent fat; and if the whole carcase can be examined, the fat about the kidneys should be especially observed, as that is not rarely reddish and unwholesome, while the rest is in good condition.

[1] The 'vermilion' and 'purple lake' of the paint-box are the only colours required to copy the lights and shades of healthy meat.

[2] *Lectures on Food*, p. 235.

Of these two latter meats, the lean should be pale, but even in tint and free from mottling.

The above-mentioned features of prime meat are still more to be insisted upon when we choose the various internal parts. They decompose quicker, and when decomposed are more unwholesome, than ordinary muscular fibre. They should have a clean bright even colour throughout, and be free from spots, speckles, and points of congestion or of bruises.

Liver, kidneys, and heart become very hard by too great or too prolonged heat. Unless, therefore, a very small dish is required, they should be avoided.

Butchers are fond of palming off the pancreas, or 'stomach-bread,' in place of the 'sweet-bread,' which is the thymus gland of the calf. It may be recognized, even when cooked and chopped up, by its large veins and arteries. It is very inferior in digestibility to the more delicate gland.

In roasting, the fat of meat should not run away into the dripping.

If these characteristics are insisted upon, we may be satisfied that our kitchen is provided with the best article, however moderate the price may be; without them we are ill served, however much we pay. They are guarantees of wholesomeness, and therefore worth more than all the negative evidence of absence of unwholesomeness.

The immediate antecedents, and the mode of slaughtering the animal certainly very much affect the nature of its flesh. Chronic loss of health of any kind makes it not only less easy of digestion, but less nutritious in proportion to the quantity eaten. The muscular fibre of a beast in poor condition is pale in colour, pinkish, yellowish, or brownish. A quantity of watery fat, of a bad colour, is intimately mixed up with the fasciculi. The colours of the two seem to blend so as to present a marbled aspect. Such meat is wet, sodden and inelastic. If it retains the mark of a finger pressed upon it, it is unfit to eat. When left unwiped, it parts with its watery

constituents, and soon lies in a pool of blood-stained fluid. When cooked its gravy is pale and mawkish, and it has lost a good deal of its substance. In the museum of the College of Surgeons[1] there is preserved a mutton-chop, the meat of which is converted into a waxy or adipocerous substance, obviously no more fit for food than are those sticks of adhesive matter with which our beaux stiffen their whiskers. This is simply an extremely advanced specimen of a condition which is commencing interstitially in the carcases of all chronically invalided animals. It is that degeneration of muscle with which the classical description of Dr. Quain made all in our profession familiar twenty-five years ago,[2] as occurring in the human body. It is found not only in organs which have been exhausted by chronic inflammations, but in those which are simply hypertrophied, and with a frequency closely proportioned to the frequency with which the special organs become so enlarged.

It is the more important to notice the effect of chronic disease upon the flesh of adult animals, because it does not in many cases prevent their being fatted up for market and presenting a delusive appearance of prime condition. Thus the 'rot,' always associated with the presence of fluke-worms in the liver, exhibits itself at an early stage in the sheep by a great tendency to plumpness. The shrewd breeder, Mr. Bakewell, 'to whom farmers owe so much' (more indeed than their customers), 'used to overflow certain of his pastures, and, when the water was run off, turn upon them those of his sheep which he wanted to prepare for the market. They speedily became rotted, and in the early stage of the disease they accumulated flesh and fat with wonderful rapidity. By this manœuvre he used to gain five or six weeks upon his neighbours.'[3] But what was the worth of this hypertrophied

[1] No. 10 in the *Catalogue of the Pathological Series.*

[2] See the plates in the *Medico-chirurgical Transactions,* vol. xxxiii. p. 196. The colouring is very accurate.

[3] Youatt, *The Sheep,* p. 446.

muscle and adipose tissue? Breeders, if they give a thought to the subject, must be conscious that the heart and arteries do not grow at the same morbid pace with the rest of the body, and the animal, imperfectly supplied with blood, is in a state of extreme anæmia. Indeed, one of the earliest known and best known tests of 'rot,' is the condition of the eyeball and lid, the inside of which is injected, but pale and tallowy, while the tear-gland is yellow instead of pink.[1] We know the look well in our chlorotic patients.

Not quite so pronounced, but of the same nature, is the anæmia which results from the constant efforts of the farmer to produce a flock which will lay on the greatest weight of flesh in the shortest possible number of weeks. Premature developement of size and of puberty is in his sight a virtue, both in those destined for the butcher and in those he selects as breeders. It is a saving of time, and time is money. I fear our agricultural societies are not free from the blame of this, inducing competition in bulk by their system of prizes; and I do not see how they can counteract the evil that has been wrought, unless by instituting rewards for prime joints, to be adjudged at the table as well as in the larder.

Good mutton is generally small; indeed large mutton can only be good—these hypertrophied breeds can only be thoroughly prime—by being kept alive till their constitution has grown up to their size. To illustrate the matter by our own race, a school-boy of six foot one never becomes hearty till he is at least one or two and twenty. But after that, the weedy youth may harden and be a fine man. So indeed with these overgrown lambs, if they are kept till four years old, the meat is very choice; but of course the temptation is to bring them to the butcher directly they are as tall and broad as a real sheep; and the farmer looks upon himself as a benefactor to his

[1] 'That dire distemper sometimes may the swain
Though late discern; when on the lifted lid
Or visual orb, the turgid veins are pale.'
Dyer's *Fleece*, book i. line 266.

species, as having made two animals in the time formerly required to make one. But I hear with sorrow of attempts being made to 'improve,' as it is called, the Welsh breed, and trust they may be unsuccessful. A more promising statement is that Welsh mutton, in the London market, is imitated by a cross between the Southdown and the Scotch.[1] We may pardon the deception, if the meat is as good as its model.

A striking proof of how opposed are the interests of the farmer and of the consumer in the breeding of sheep is, that in the minute experiments and calculations of the advantage of different breeds and various modes of feeding, no attempt is made to reckon the goodness of the dead meat. We are told the weight, but never the quantity of osmazome it contains, though the readiest possible test in the tint of the gravy is very familiar to the eater.

To get good mutton in country places is now a serious problem, and I would suggest to my professional brethren, who are of course permanent residents, that they cannot confer a greater boon on families in the same position of life as most of us are, that is to say, not rich enough to have parks and farms, and yet willing to pay a good price for a good article—I say they cannot confer a greater benefit on these their neighbours, than by inducing them to join in a 'mutton club,' buying the lambs of a full-sized breed, and keeping them to at least three and a half years old before killing. The price per pound will not be less than charged by the butcher, but it will supply an article twice as good as his.

There has been felt a good deal of alarm, more I think than is justifiable, during the last few years on the subject of the class of parasites which are not uncommon in the flesh of all animals, namely the *cysticercus* and the *trichina*; and which, when sufficiently numerous to be conspicuous, constitute what is called 'measly meat.'

The *cysticercus* of the pig is the sort most frequently seen,

[1] Macdonald, *Cattle, Sheep, and Deer*, p 483.

forming a cyst as large as a hemp-seed. Its commonest habitat is the tongue, on the under surface of which it may be discovered even without cutting into the interior. You may also find the oval holes left by it when dried up in, otherwise, very perfect hams, and opaque white specks, like seeds, intimately adherent to the muscular fibres, which are its remains dried into calcareous matter. This measle-worm of the pig has been found by the industrious German naturalist Küchenmeister to be the undeveloped embryo of the *tænia solium*, the tape-worm of most usual occurrence in Great Britain. By keeping them alive in warm milk he was able to watch the developement of the animals. The *cysticercus* of the ox is smaller, and is either rarer or seldomer discovered in this country. It becomes the *tænia mediocanellata*, the species which infests the intestines of Germans, Swiss, and others, producing exactly the same inconveniences as that with which we are familiar. As the measle-worm of the mouse produces the peculiar tape-worm of the cat (*tænia crassicollis*), as the brain hydatid of the sheep (*cœnurus cerebralis*) produces the *tænia cœnurus* in the dog, so the minute larva which infests the flesh of our prey revenges itself on its natural enemy. An old boa constrictor is always a complete museum of tape-worms, derived from the various living game which it has devoured.

Now, there is no doubt that the boiling temperature entirely destroys the vitality of these creatures. When cooked they can do us no more harm than a baked lion. So that it can very rarely, if ever, happen in civilized countries for them to be transmitted directly to human intestines. Another mode of communication must be thought of, and I think it is not far to seek. Though we do not eat our food raw, dogs very often do, and they distribute far and wide by their excreta all that escapes the solution of the gastric juice. Thus the embryos get spread abroad on the earth, into streams and wells, and especially in our kitchen gardens among the materials of our salads. I had once brought to me a child three

years old, with tape-worm, a very rare thing at that age, and thus affording peculiar facilities for detecting its origin. It was the son of a sculptor in the suburbs of London, and all the cooking arrangements of the family seemed perfect, as also their water supply. But in the stone-yard, which had once been a garden, grew a quantity of nasturtiums, and among these the baby used to play, and sometimes ate the flowers and fruit. As the yard was open to the road, it was much frequented by the dogs of the neighbourhood, and showed unmistakable signs of their presence. One could not question that here lay the carrier of the little patient's troublesome inmate. The observant and enthusiastic physician of Iceland, Dr. Hjaltelin, also informs me that intestinal parasites are exceedingly common in that country, and that the cause appears to be the distribution of their ova by stray dogs who are always in and out of the kail gardens. Another possible source of *tænia* may be shell fish, eaten raw, and often containing in their stomachs minute organisms derived from decayed garbage thrown away or used as bait. Only the other day I found in the prehensile organs of a prawn a shred of animal fibre, and saw a man fishing for crabs and prawns at the mouth of the Arun with a piece of paunch. With all these possible sources of infection there is no need to suspect butcher's meat, which is never eaten raw except by some eccentric amateur savage.

The real evil of measly meat consists in its proneness to rapid decomposition in spite of cookery, and to that may fairly be credited cases of illness which are reputed to have followed its consumption. So that it is fair enough that all that is largely infected should be destroyed. In France there used to be appointed to the markets officers called '*langueyeurs*' from their inspecting the tongues of carcases offered for sale; but their legal authorisation, and possible tyranny, seems to have given dissatisfaction, for M. Delpech says they have no lawful authority, but are employed simply as a warrant between buyer and seller. They have to report to the inspector of

markets, usually a skilled veterinarian, who judges if the quantity of measle-worm is sufficient to render the meat unwholesome. The shoulder and the breast are the parts usually examined as tests.[1]

The *trichina spiralis* is another parasitic inhabitant of live flesh, of a more active character and of a higher grade in creation than that last discussed; for instead of being a solid worm like the tænia, it is possessed of an intestine.[2] It is sometimes found in human flesh and in pork, appearing as a minute white speck, just visible to the naked eye, which constitutes its nest, in which one or two curled-up specimens are seen, by a microscope, in active movement, but prevented from doing harm by the cyst in which they are imprisoned. The danger consists in its escape and wonderfully rapid multiplication, under special circumstances not very clearly defined; for it exists at most times in considerable numbers without giving rise to any symptoms whatever. But there seems sufficient evidence that in a few instances an epidemic has occurred of its invasion, in overpowering quantities at once, of human bodies, through the food eaten. The symptoms are inflammatory fever and local lesions from the interstitial presence of a mass of quickly increasing foreign bodies. But these instances have been extremely rare. A few years ago a physiologist in this metropolis, having become the fortunate possessor of some specimens of live trichina, instantly invited a crowded conversazione of medical men and others interested in the natural history of our species, and introduced to them by means of the hydro-oxygen microscope his acquisition. Very few of the party, if any, had seen one before: and very few, if any, have seen one since.

The trichina is said to cause degeneration of the muscular fibres in its vicinity, so that the joints infested would not

[1] Delpech, *Dict. encycl. des sciences méd.*, art. 'Ladrerie:' an excellent monograph on the subject, date 1868.

[2] Professor Owen has identified the *trichina* as one of the Cœlelmintha, and the College of Physicians has adopted his classification.

present the healthy appearance described at the beginning of this section. It is killed by the temperature of boiling water, so that if a dish is fairly cooked, it must be quite safe. The cases which have occurred of its proving deleterious have been where the meat has been eaten raw, or imperfectly warmed through and served cold, with its defects concealed by some enveloping sauce. No decently delicate feeders need be afraid of it. If the leaden dull colour of the meat before us has been destroyed, so that it does not look raw when the gravy is run off, and if the peculiar texture of fibre which distinguishes uncooked meat, is removed, we may be sure that the temperature has mounted up to that sufficient to coagulate albumen (150° Fahr.), and that any stray trichina would be killed on the spot or permanently imprisoned in a solid nest.

It may be proper to mention that no form of drying, salting, or even smoking at a low heat, is sufficient to destroy the trichina. So that when travelling in Germany it is wise altogether to avoid the sausages and uncooked ham often served up in thin slices, and which, in point of fact, have been proved the sources of trichinous poisoning in the few instances on record.

The whole influence of *fevers and inflammations* upon the flesh of animals thereby affected during life, and whether they should be considered as a reason for its being pronounced absolutely unfit for food, is a moot-point. There is a good deal of hearsay evidence on both sides, but I cannot find any crucial cases recorded as observed by competent witnesses.[1] An enormous quantity of meat is destroyed on this ground, for, according to Mr. Youatt's estimate, one-fifteenth of the

[1] 'In no well-ascertained case has it been found that any ill effects have been produced by eating the flesh of diseased animals, although there is abundant evidence that at the outbreak of the distemper in Massachusetts, and before public attention had been directed to its true character, a considerable number of animals, in which the usual premonitory symptoms had appeared, were slaughtered and their flesh sold.'—*Second Annual Report of the State Board of Health, Massachusetts,* 1871.

whole horned stock of the country die annually of inflammatory fever, milk fever, red-water, hoove and diarrhœa, and one-tenth of the sheep and lambs are carried off by corresponding ailments.[1] When we add those which perish by accident and accidental sickness, it is obvious that several million tons of meat are thus taken out of human mouths by the law which insists on the destruction of all which bears the marks of disease. Opponents say that if it possess only a fraction of the nutritive power of good meat, it ought not to be wasted, but sold at a lower price, provided always proof can be obtained, that it does not, when eaten, communicate disease. This, as said before, is a moot-point, but yet what is certain is to my mind quite sufficient to justify the exclusiveness of the existing regulations. It is certain that there are some diseases, originating in beasts, which may be communicated to men handling the carcase before it has been submitted to the action of heat, as for example *pustula maligna* and glanders. And some fevers, such as typhus, are common to man and beast, and are indubitably contagious during life, and probably after death, till the flesh has passed through the purification of fire. Now most of those who would buy diseased meat on account of its cheapness, cook their own victuals, and are exposed to all the evils which may accrue from handling a dangerous article. Again, this 'braxy' meat, as it is technically called, runs rapidly into decomposition, and becomes a serious nuisance on that ground alone. It is also frequently saturated with the soluble drugs which have been given as medicines by the veterinarian. Ergot of rye, digitalis, opium, tartar emetic, are often administered in enormous quantities. Mr. Youatt advises upwards of half an ounce daily of solid opium for an ox with lock-jaw, which is 240 times the full human dose, and as this is equally distributed to the soft parts by the circulation, in a beast (say) of twenty stone, each pound would contain at least half a grain

[1] Youatt, *Cattle*, Preface.

of the poison. A case is recorded, in which tartar emetic taken by an ox before slaughtering produced serious effects on 107 persons who partook of the meat.[1] One person who died had eaten only half a pound. Tartar emetic was found in the contents of his abdomen.

Acute fevers cause an acute degeneration or interstitial death-in-life of both blood and tissues. Virgil notices that in victims slaughtered during the cattle-plague the peristaltic vermicular motions of the intestines, by which the priests told fortunes, are stayed, and that the blood is as the blood of a corpse, scarcely staining the knife—

> Nec responsa potest consultus reddere vates,
> Ac vix supposititi tinguntur sanguine cultri.—*Georg.* iii. 491.

And it may be remarked that the poet, who is a practical farmer as well as the most picturesque of sweet singers, expressly says that he is here speaking of the early stage of murrain, the fatal later symptoms of which he describes afterwards. The Reports of the Cattle-plague Committee of Privy Council show, that his lines will apply to England as well as to Italy. Now, it can hardly be maintained that it is honest to sell in the market meat thus saturated with natural death, though the animal has been slaughtered before the full declaration of the fever.

The best possible meat may be rendered unwholesome by normal decomposition. The stomach can, indeed, through habit, become used to food in this state; and thus may be accounted for the instances we read in books of travels, of savages, like the Eskimos, who bury their flesh till it is putrid, or like the Zulus with whom (according to Dr. Colenso) the synonym for heaven is 'maggoty meat.' Of course, rather than die of starvation, or be reduced to the straits suffered by Hezekiah's army, one would acquire such an habit, and

[1] Quoted by Dr. Pavy from the *Central Zeitung für Veterinärmedizin für* 1854. *Treatise on food*, &c. p. 149.

invent a sauce to make it tolerable; but it is scarcely worth while to do so in civilized society. Under ordinary circumstances many cases are recorded in works upon poisons, such as Dr. Christison's, where decayed animal food has produced severe and even fatal diarrhœa, in spite of cookery having concealed some of its repulsiveness. High game has fortunately gone out of fashion, and the most frequent form in which we now meet with decomposing albuminoid matter is that of a fusty egg. Some housekeepers seem to consider this quite good enough for made dishes, and thus spoil material worth ten times what they save by the nasty economy. No egg should be allowed to enter the kitchen, that has the slightest smell of rotten straw. But this seems rather beyond the subject of butcher's meat, and it is time to proceed to another department of the larder. The suitability of different sorts of meat to different constitutions will be considered in a future chapter.

§ 2. Poultry and Game.

Tenderness is the chief virtue in poultry, and is most difficult to find in the winter season. Spring chickens come in with May, but during the five previous months much care is requisite in purchasing this article of the table. A young, and therefore tender bird, may be known before plucking by the comparative largeness of the feet and the leg joints. And when a fowl appears at table with a thin neck and violet-tinted thighs, it is wise to avoid being helped to the leg. These are invariable signs of age and toughness.

The same violet tinge may be noticed in the thighs of old turkeys, which are also distinguished by their hairiness. The age of ducks and geese may be tested by their beaks, the lower part of which breaks away easily in youth.

Besides being tough and indigestible, an old fowl has a rank flavour, like a close hen-house, which arises from the absorption into its flesh of the oil furnished by nature

to lubricate the feathers. This is still more perceptible in old ducks and geese. It may often be tasted some time after a meal, and must therefore, like most rank oils, arrest digestion.

Game may roughly be selected by the same rules as poultry. Those who have interested themselves in ornithology may also get some help from observing the undeveloped spurs in young gallinaceous birds, and the pointed long-wing feathers of the young partridge, which become rounded at the tip when he is old.

Poultry should not be too fat. In cooking, the oily adipose tissue becomes rank, and is less digestible than the fat of mammalia.

§ 3. Fish.

The sanitarian has not much advice to give concerning the marketing of raw fish, except that it should be fresh. The guides by which to judge of this are the fulness of the eyeballs, and the bright pink hue of the gills. The sense of smell cannot be trusted to, as it may be deceived by the use of ice. When cooked, the flesh of fresh fish is firm but friable; that which is stale is flabby and stringy, even if preserved by cold from actual putrefaction.

The less salt, and the colder, the water is whence our fish comes, the better adapted is it for the table. At Gibraltar it is not hard to distinguish the mullet caught on the Atlantic side of the rock from that which lives in the Mediterranean, a warmer and more concentrated sea; so much is the advantage on the side of the former. An Icelander dining at my house passed by with polite scorn a piece of prime Scarborough cod. Seeing my surprise, he explained that no one who has tasted it at Reikiavik could bear to eat cod in England, and that it was best in the polar circle, braced up by the melting icebergs. The nearly fresh waters of Loch Fyne supply the choicest herrings, and the pure light moun-

tain streams a better trout than our lowland streams, where the atmospheric pressure is greater.

Every sort is best when it is cheapest, for then it is most plentiful and in fullest season. It is a wise plan to contract with your fishmonger to send you so many dishes a week at a fixed sum, and then it becomes his interest to supply that with which the market most abounds. For healthy persons, every kind ordinarily exposed for sale in England is wholesome, provided it be good of its kind, and not spoilt in the cooking. The selection of fish for invalids will be discussed later.

Complete cookery, however, should be insisted upon. The conger-eel, for example, is a very foul feeder, and has been known, if carelessly grilled, to cause diarrhœa, probably from the fetid contents of the stomach saturating the flesh. And at the Pathological Society on May 5, there was shown a specimen of the bunch-headed tapeworm (*Bothriocephalus latus*) which had grown in a person used to eat half-cooked fresh-water fish.

The only sort of reptile of dietetic importance is the *turtle*. It is sometimes viewed as a mere luxury, but is in reality a most digestible and nutritious food, and if more demanded would quickly become more plentiful in the market. The creature grows too slowly for it ever to remunerate artificial culture, but nature supplies it in immense quantities, and its tenacity of life enables it to be brought over alive from the tropics. Fresh turtle is much more costly than it ought to be, but the rival importation of dried turtle fins is reducing the price. This last-named article is of great value, and of moderate price; from it, first-rate real turtle-soup may be made at no more than the expense of mock-turtle, if we deduct the price of the wine used, which to some palates is no improvement. The fins should be soaked for at least twenty-four hours before cooking.

Caviare, the roe of the sturgeon, is best obtained from a fishmonger. The dealer in preserved provisions seems to

think it all the better for being preserved, whereas it should be as fresh as can be got, exhibiting its freshness by its softness and light colour. That black, hard sort of fish-jam which is sometimes served up, is really unfit for human consumption.

All that has been said above, applies equally to *crustacea* and *shells*; but an additional remark may be made about *crabs*. They should be cleansed scrupulously before cooking, and if that which is removed from their prehensile organs is fetid, they are hardly to be considered safe. The frequency with which crabs disagree unexpectedly with a healthy stomach, may be attributed with reason to the garbage on which the creature lives. And of *oysters* it should be remembered that they are to be eaten raw, or, at most, barely warmed through; for complete boiling makes the flesh tough, so that it is prudent, if they come from near river-mouths, to keep them alive in a shallow dish of clean brine for a day or two, feeding them with meal, and changing the water so as to leave them bare twice a day, in imitation of the tide. They become peculiarly plump and wholesome under this management.

§ 4. Garden Produce.

The commonest fault committed by housekeepers in respect of vegetables, is that they do not supply a sufficient variety, seeming to consider that the meat is the only part of the meal that requires care, and that all the rest is mere garnish beneath the notice of a Briton, and unfit to sustain his vigorous life. Yet that is not the experience of the observers of mankind. The attention of Herodotus was called to the fact that the Persians, the manliest and most sporting nation in the old world, had at meals not only several dishes, but several courses of vegetable food, preceding a very moderate allowance of solid meat.[1] And Sir Henry Rawlinson describes the diet of this tough race as practically the same now, so that the

[1] Herodotus, *Clio*, cxxxiii.

assumptions of some anthropologists that hunting races are necessarily riotous eaters of flesh, and that carnivoracity strengthens a nation, are not accurate. The Persian gentleman is the spiritual father of the British squire;[1] yet, at many a hospitable board, if a guest does not fancy meat that day, or has eaten enough of it at a previous meal, he will have to fall back upon potatoes, or to solace himself by picking a few bits out of the sauces of made dishes, where the vegetable flavour has been saturated with that of meat and spoilt. Usually, he goes on eating too much nitrogenous food out of sheer idleness.

Another fault is that the vegetables are not sufficiently fresh. Unhappily dead plants do not stink early enough to disgust the nose; but yet, every minute they are kept after their actual death, that is to say, after they have ceased to be capable of growth, renders them in some degree less digestible. Sometimes they are kept too long out of mere carelessness, sometimes from lack of sale, but sometimes also intentionally, to make them look better at table. For a long time, I could not make out why London asparagus so often disagreed with people, till at last I caught a gardener cutting it twenty-four hours before it was wanted, and putting it in a damp warm frame, 'to swell' as he said. Cucumbers and broccoli are often spoilt in the same way. The vast wagons of cabbage that one sees coming into London at midnight are often the bearers of two or three days' cutting in small gardens, kept till a full load is accumulated for a single journey; as early travellers by rail may see for themselves. Sprinkled with water they look well, but never regain their fresh character. They ferment in the stomach, and produce flatulence.

Potatoes.—The virtues of a potato are to be mealy and powdery when boiled, and to mash readily into a smooth

[1] He taught his sons 'to shoot, to ride, to speak the truth,' and then left them to educate themselves; he was devoted to his sovereign to a degree that astonished Herodotus; and he loved a good glass of wine in good company.

purée. This shows that the starch granules are in a healthy condition, and that they absorb water and burst the envelopes of glutinous matter which the heat has coagulated. Young potatoes, from not so easily breaking up, require long mastication to render them soluble, and are not then very digestible. But old waxy potatoes are worse, for they seem to unite again into a sticky mass, after being swallowed, and remain for hours undissolved; the worst of all are potatoes affected by the peculiar epidemic called after their name. The diseased part, looking as if it were stained with a drop of ink, remains quite hard in spite of any amount of boiling and digesting: eating it is equivalent to eating so much rotten wood. Potatoes which have begun to sprout, are also indigestible, and frosted potatoes begin to decay immediately a thaw sets in. The best potatoes are 'Regents.'

Jerusalem Artichokes are largely used in England by people who have gardens, partly because the plant is handsome, and partly because the root is not injured by frost, and so can be allowed to remain in the earth during winter. The dried stem is also convenient for firing. It is a watery vegetable, and though it had the start of the potato in European horticulture, it has never been brought to the same perfection. The fact is it contains no starch, and the 'inuline' which replaces that valuable aliment, is only 2 per cent. of its weight, whereas in its successful rival there is a proportion of 16 per cent. It should be eaten only as an occasional change, for the sake of its flavour.

Turnips may have nearly the same things said of them.

Yams and *sweet potatoes* come now into the London market. They are as mealy and wholesome as the commoner tuber, and are sometimes useful to tempt our patients into the use of vegetable diet.

Carrots contain a quantity of pectin, which can be extracted from them in the form of a jelly, and is often used by confectioners to mix with fruit jelly as a diluent. It resides principally in the outer rind, whose thickness therefore in proportion

to the pale core is a test of the goodness of the specimen. When soft and friable they are much more nutritious than turnips.

Parsnips may take to themselves the same praise, and ought to be more used, especially with boiled fish. From their sweetness they make excellent fritters, and are liked by children, to whom they are well adapted. However, when old and stringy, they should be avoided.

Salsafy is in England considered more a dish for the *gourmet*, than as a food for middle-class tables. This is unjust, for it is nutritious and digestible, and grows easily. It is best eaten alone, fried in a thin coat of batter. It should break readily, and be free from strings.

Leeks make a capital soup and a most digestible side dish. The more white there is in them, and the less green, the softer and better they are. They should have but little smell.

Sea-kale should be perfectly blanched. When coloured it is indigestible, as is shown by its being tasted in the mouth after dinner.

Asparagus should be eaten as soon as possible after cutting, and then it is most wholesome. The greenest asparagus is that which contains the greatest amount of the active principles, bitter and resinous, and is therefore to be chosen in preference. I have known timid patients to fear that it must be injurious to the kidneys, because of the peculiar odour communicated by it to the urine. It certainly does no harm, and I doubt almost if it is a diuretic.

In early spring, the fresh young fronds of the male fern make a good imitation of early asparagus, and are decidedly better than the wild asparagus brought to table in the south of Europe. With other substitutes for it I have no acquaintance. The number of them shows how well worth having the real thing is.

Cabbage is the most valuable anti-scorbutic we possess. In the slight degree of scorbutus characterised by bleeding of

the gums or by purpura, it is eminently successful, and prevents the same thing happening to other members of the household who are wise enough to prefer prevention to cure. It should be soft but crisp before cooking, and show no signs of having been wetted. If it has begun to heat from incipient fermentation, it is most noxious, and generates in the intestinal canal an enormous amount of flatus, consisting not only of the usual carbonic acid, but of sulphuretted hydrogen as well. Fermentation destroys the anti-scorbutic qualities of the cabbage, for sour-crout is not nearly so efficacious as the fresh plant.

Sour-crout is prepared by taking advantage of the fermentation as a means of after-preservation. The leaves of the kail are allowed to heat, and then subjected to severe pressure, which arrests the chemical action, and hardens them into a dry mass which will keep a long time. It requires much soaking, and should not be cooked till free from all sour taste. It should not want chewing, or it is shown to be underdone.

The best sorts are the old white garden cabbage and the summer cauliflower.

Winter greens are of so many sorts that it would be necessary to be a complete gardener to give rules for the selection of each. Their greenness and freshness at a time when all around is brown and decaying is the attraction to them; and it may be said generally, that therefore they ought to be as fresh and green as possible. Under this heading I include savoys and Brussels sprouts, but not broccoli, which should of course be as white as can be got.

I take the opportunity of having to allude to *kohl-rabi* (a new kind of cabbage of which the leaf-stalks are eaten), to say that it is not prudent to recommend to our patients novel varieties of garden produce, unless we are well acquainted with them ourselves. We do not know how to decide if they are good of their sort or not; and much more depends upon that than upon the kind of vegetable.

Cardoons.—Those who grow this delicious thistle, which is

seldom brought to market, should take care that the leaf-stalks are at least an inch and a half thick before they are considered fit for cutting.

The artichoke is another thistle, like the last-named, of an ornamental character, and more cultivated in this country. Eaten raw, or only just warmed, as is common in France, it is as indigestible as nuts, which it much resembles; but well boiled till it is quite soft, it may be eaten with impunity even by invalids. After an early dinner it makes a good dish for supper.

Chestnuts are a very good substitute for potatoes with white meat or fowl. They should be thoroughly well boiled, skinned, and served up in a hot dry napkin. Home-grown chestnuts are the best, being more mealy and powdery than those imported. A sweet soup also may be made of chestnuts rubbed through a sieve; but I cannot recommend the polenta, cake, and bread made of this nut, which are so popular in Italy. It requires a long education to accustom the digestion to them.

Vegetable marrow, squash, elector's cap, and a few other sorts of pumpkin are wholesome diluents, but do not form a substantive diet. The same may be said of the *tomato*. Care should be taken that they are ripe, or they cause colic.

Peas and broad beans should be young, and their skins tender enough to crack in boiling. If they are past the time of life for this to happen, they should be chopped, mashed, or otherwise broken up; for the unbroken skins are very leathery. The longer they are boiled, the harder they get.

Dried peas, split peas, are deprived of their skins already; so that if well boiled, as in soup or pudding, they are very good for food for robust people.

It appears wasteful to throw away the outer shell of the pea. It contains a great deal of nutritious matter, but it is not nice in the commoner sorts. There has been lately introduced a new pea, the shell of which is edible, and seems wholesome.

French beans, from the kidney bean and scarlet runner, are still more required to be young and tender.

White beans are the ripe seeds of the same plants. They are not popular in England, apparently because they do not blend well as an adjunct to meat. But eaten alone with a piquant sauce, they are a most palatable variety of dish, and certainly nutritious.

Lentils, again, are too much neglected. They make a capital soup, resembling pea soup. The peculiar flavour of lentil flour, which is distasteful to some persons (reminding them of garden seeds they say), may be masked by adding to it some sugar and Indian corn flour or fine barley meal. Or if it is wanted for soup, a few bits of celery or asparagus cover the objectionable taste completely. It is sold under the name of revalenta arabica at a higher price considerably than is charged for it as lentil flour at a corn-dealer's.

Mushrooms are best when grown in an open meadow. When forced they are tough and indigestible, and when preserved they are tasteless as well. A meadow mushroom should peel easily, and it should be of a clean pink colour inside, like a baby's hand, and have a frill or 'curtain' (as botanists call it), attached to the stalk. When the gills are brown they are growing old and dry, and losing their nutritive qualities. The above-described *agaricus campestris* is the queen of its class for cooking purposes in England. It is true there are several other similar fungi eatable, and eaten by experimentalists; but my experience of them is that their flavour is inferior, and that we lose nothing by the safe rule of adhering to the one we know well by sight.

The *Gigantic Puffball* makes excellent ketchup, and can be eaten in the shape of fritters. It must be large and very white, like a great bleached skull. When discoloured it is beginning to ripen its spores, and is then poisonous.

The *morelle*, the fan-shaped *chanterelle*, and the black *truffle* should be sweet and fresh. The odour of the last-named

when decomposed is so horrible that one can hardly fancy its being tolerated; yet I have known a cook use truffles in this state, and say she thought it was the right smell.

Materials for salad.—Here again, as in the case of winter greens, the plants used are so many and various that to enumerate them would be as tedious as useless, and to describe their several tests of salubrity would require more horticultural knowledge than I possess. Repelled by the barbarous and barren aspect of a list of their technical names, I was comforted by the recollection of a scene of long ago. A party of young gentlemen and ladies were earnestly disputing about the nomenclature and specific differences of certain plants, and appealed to grandpapa, an elderly Parisian; he settled the matter in a moment—'*Eh, mes chers, ce sont des salades.*' I shall imitate him in condensing them into a class.

Vegetables intended to be used for salad should all be fresh and crisp, and sweet and clean. Their colours should be positive and even, the reds very red, the whites very white, and the greens pure as those in an autumn sunset sky, except in the full-grown leaves such as watercress. The salad ought to be dressed by one of the daughters of the house, after she has herself dressed for dinner, singing, if not with voice, with her clean cool fingers, sharp silver knife, and wooden spoon,

> 'Weaving spiders, come not here;
> Hence, you long-legged spinners, hence:
> Beetles black, approach not near;
> Worm nor snail, do no offence.'

The purity of the bowl is more important than that of Titania's bower. So will the guests eat it with light hearts, free from all fears of noxious ingredients.

With a little trouble, not however necessarily attended by expense, a succession may be provided of materials for salad all the year round, so as to have one at table every day. And a great preservative of health I believe it to be for hearty persons. The most difficult season to provide for is the latter end of the winter, and it may be of use to mention that the

dandelion is then a friend in need. If a pot be placed over the plant as it grows, or the leaves tied up like lettuce, or it be transplanted into a frame, it can be bleached, and thus loses its bitterness. Daisy leaves are also eatable; and thus with a sprig of tarragon, a few cold potatoes, and some ever-constant mustard and cress, giant cress, Australian or curled cress, an olive or two pared thin, or some beet-root and a slice of Madeira onion, a great variety of combinations may be made. Indeed, an inventive lady, with a well-furnished cruet stand, a bottle of Worcester sauce, and some *moutarde de Maille*, might provide a different salad every day of the year. These 'scratch' salads are very much improved by a table-spoonful of light white wine. Watercresses rather spoil salad, and are best eaten alone, so as to make a variety when nothing else can be obtained. And the same may be said of radishes, and of endive, which are too strong in flavour to combine well.

Some persons are very fond of tomatoes sliced raw, and eaten as a salad with oil and vinegar. They appear to be quite digestible in this state, if ripe.

Celery and *cucumber* raw are not suitable for eating after a heavy meal. The quantity of woody fibre in them adds an additional load to the stomach, at a time when all its powers are required. With bread and cheese, as a light lunch, they give an agreeable zest, and seem to stimulate the secretion of gastric juice. That is the time for their admirers, and they are many, to enjoy them.

The selection of mere *flavouring herbs*, such as onions, garlic, mint, tarragon, &c., is not a matter for the dietician to discuss. He may, however, say one word in favour of temperance in their employment. An excess makes us unpleasant to our neighbours; and disguising the true flavour of the meat, it leads to our putting up with an inferior article. The object to be aimed at in their use is to promote the secretion of digestive solvents; and the degree in which they attain this object may be judged by the watering of the mouth; a

whiff of them excites the flow of saliva, a copious dose runs it dry.

The produce of the kitchen garden, classed according to the main objects which its use serves, may be divided as follows, the order adopted in each class being a rough estimate of the plant's average value as an esculent.

1. *Starchy and sugary plants.*—Potatoes, yams, chestnuts, beans, lentils, peas, Jerusalem artichokes, carrots, parsnips, beetroot, salsafy, turnips.

2. *Stimulants.*—Asparagus, wild onions, artichokes, strong onions, garlic, and other substitutes, aromatic herbs and other flavours, mustard, cress, and a few other pungent salad materials.

3. *Anti-scorbutics.*—Cabbages, tomatoes, and salad materials in general.

4. *Diluents.*—Cabbages, spinach, turnip-tops, winter greens, broccoli, cauliflower, Brussels sprouts, sorrel, nettle-tops, and in short any leaves sufficiently palatable to eat and soft to swallow, which are green when boiled.

The use of the *first class* is obvious from the powers assigned to starch and sugar by the investigations quoted in the last chapter. Each of these vegetables is a direct food contributing to the force of the body in health. How under certain circumstances some, or all, become unsuitable, will be spoken of in a future part of the volume.

The effect of *stimulating* vegetables is to cause an increased secretion of saliva and gastric juice, thus enabling a greater quantity of food to be dissolved.

Anti-scorbutics seem to act by contributing some of the materials of the blood of lesser amount, though of importance to the general vigour of the constitution. Herodotus implicitly attributes the activity and healthiness of the Persian race to the variety of fruit and vegetables consumed by them. And I feel sure that the puniness, infertility, pallor, fetid breath, and bad teeth, which distinguish some of our town populations, is to a great extent due to their inability to get

these articles of the table fresh. The watercress seller is one of the saviours of her country. The consumption of lettuce with his tea is an increasing habit worthy of all encouragement in the working man, but he must be warned of the importance of washing the material of his meal.

The last hint is given in view of the frequency of the occurrence of the large 'round worm' (*ascaris lumbricoides*) in the labouring population of some agricultural counties, such as Oxfordshire for example, where unwashed lettuce is often eaten at this meal. Naturalists will not allow us to think that the creature is a lob-worm, altered by its birth in an abnormal habitat. But at all events its ova will live for years in moist earth,[1] and may easily be brought in from the garden, which has been manured from all sources.

Diluents contain a large proportion of woody fibre and chlorophyll, which are little, if at all, soluble in the secretions of the stomach, and are not converted into sugar by the saliva, as starch is. And they are not liable to be removed by absorption like water, the most universal diluent. Their use would appear to be to get mixed up with the nitrogenous articles of food, so that the mass may be permeated by the gastric juice and presented gradually to the absorbents. Like gelatine, though apparently not nutritious themselves, they make other things nutritious. Their benefit is made manifest by the improved action of the bowels after their employment.

§ 5. Fruit.

Fruit is hardly ever eaten except because it is nice. A very good reason no doubt, but one that rather removes the consideration of the subject from the scope of the dietician.

The safest time for taking fruit is in the morning or afternoon with stale bread and a draught of water. Thus may be made a very wholesome and digestible lunch. The worst time

[1] Davaine, quoted in Reynolds' *System of Medicine*, vol. iii. p. 194.

is after a heavy dinner. Adults often complain that they cannot enjoy fruit as their girls and boys do; the fact is they eat it at a wrong hour of the day.

Grapes, figs, peaches, cherries, oranges, and strawberries, may be considered to be the most digestible; plums, apples, pears, and apricots are less so; while melons, and other cold watery things, are not only indigestible themselves, but prevent digestion.

In selecting oranges, especially for our patients, it is best to take those with the greenish calyx still adhering to them; they are the juiciest and ripest. The fewer pips, the better the orange, or lemon, or grape.

Nuts and almonds have not justice done them by nature. They contain an enormous proportion of a valuable nitrogenous aliment, which in the latter exceeds half its weight, and is called 'emulsin' from its diffusibility without solution in water; yet this is so cut off by its natural concentration and hardness from the action of the gastric juice, that it is scarcely digested at all, unless chewed and cooked much more than usual. When chosen for food, they should be used in extreme moderation, and at a time when the stomach is at leisure, and can devote all its powers to their solution. When pounded and employed as a flavouring, they are innocent enough. Frying them with butter, salt, and pepper, makes a tasty and wholesome hot dish for dessert.

Cookery, breaking up the texture of all fruit, makes it much more easy of digestion.

The Jews, who eat much fruit, assign that habit as a reason why their people suffered less than others from cholera, during recent invasions of the epidemic. But it may be remarked that they sell a good deal of fruit, as well as eat it, and may possibly be prejudiced in favour of the trade. It can hardly be wise to consume more fruit than usual, at a time when a chance looseness of bowels is often the exciting cause of a fatal affection of the system, excited by the special poison then prevalent.

§ 6. Groceries and Chandlery.

Recent legislation about adulteration has been directed more against the grocer than against any other of our purveyors. The stores he sells have all gone through a process of manufacture, which alters their natural aspect, and therefore gives great facility to fraud. The fraud consists in mixing a cheaper substance with a more expensive, and disguising the mixture. The disguise may be deleterious to health, or it may not, or it may even make the compound more wholesome, but the fraud is the same. In these pages, however, we have to do only with those adulterations which render the goods less fit for consumption as food.

The line will be taken of shortly pointing out the characteristics of the best articles, without attempting to enumerate the sophistications to which they might possibly be subjected, but against which the possession of good characteristics practically warrants them. To detect the special method by which bad groceries are made bad, requires the detector to be as acute as the rogue he is trying to expose; and unless he makes that his sole ambition in life, he is not likely to succeed. Money-making is a much stronger stimulus to invention than the love of truth. If a customer suspects adulteration, he will act wisely to place the matter in the hands of the legally established analyst of his district, the expense of the proceeding being now made very moderate.[1]

Tea.[2]—The uses of tea are—

[1] Not less than 2*s.* 6*d.* and not more than 10*s.* 6*d.*

[2] I take the opportunity of the first mention of a purely foreign product, to say that the most interesting way of enlarging our ideas on the subject of food production, is to spend an afternoon now and then at a classified collection of living economic plants, such, for instance, as that at the Botanical Gardens, Regent's Park. It is much pleasanter to think of tea as connected with the pretty little camelia it comes from, than with blue paper packets; and the despised 'grounds' will for ever after acquire an interest in our minds. Who would have expected pepper, and ginger, and rice, and sugar

1st. To give an agreeable flavour to warm water required as a drink.

2nd. To soothe the nervous system when it is in an uncomfortable state from hunger, fatigue, or mental excitement.

The best tea, therefore, is that which is pleasantest to the taste of the educated customer, and which contains most of the characteristic sedative principles. The sedative principles in the leaf consist of an essential oil—which may be smelt strongest in the finest teas, weakest in the inferior sorts, entirely absent in fictitious teas—and of the alkaloid *theine*, which may be demonstrated by heating some tea dry in a silver pot, when the salt will appear as a white bloom on the metal. If there is any bouquet at all, or any *theine* at all, in the specimen examined, it is worth something.

The shortest way to test the *comparative* value of different specimens is to put a tea-spoonful of each in one of the little china tea-pots or cups with covers, here used as ornaments, but originally intended for this very purpose, which has been previously made quite hot. Shake the tea about in the hot pot a few seconds, and then pour on, quite boiling, a small half-cup of water on each. Cover them up quickly, and let them stand by the fire about a minute. Taste them immediately without milk or sugar, and choose that which has most aroma.

On examination of the contents of the pot after use, there will be found in good specimens very little of the dust or broken leaves. The said dust, in fact, consists of the sweepings of the warehouses which the Chinese manufacturers make up with rice starch into pellets, and use to adulterate the real article, under the name of 'Lie tea,' which expresses its character very well. The hot water dissolves it again into genuine dirt.

to look as they do when growing? No consumption of midnight oil over botanical books, gives so much real knowledge as this short hour of healthy observation.

As tea is made from more than one variety of plant and from leaves at different periods of maturity, the shape and other characteristics of the foliage are not very distinctive; but I think, as a general rule, that, after infusion, the best leaves are the thickest and pulpiest in texture.

Green tea, normally, contains much more of the essential oil than black; but then its higher price offers a great temptation to frauds, and if it is used, more care is needed in its selection.

Cheap black tea sometimes owes its cheapness to the admixture of leaves damaged by damp, or which have been actually used and redried. This is easily detected by the scent, but as there still remains a quantity of tannin and colouring matter, people will use it, and think they have got an article worth the price it is sold at. However, good hay, or a bunch of wild thyme or mint, would really afford a pleasanter and wholesomer drink. The dried colouring matter is quite insoluble, and the tannin makes the aliment with which it comes in contact insoluble, and indigestible also.

The chemicals used to put a 'face,' or agreeable aspect, on bad tea are not poisonous, being simply so much inert dirt. They consist of indigo, prussian blue, whitewash, plaster of Paris, heavy spar, and the like; new things being substituted as the old ones get found out. Their presence, however, shows that the tea is more or less bad, or it would not have been faced.

The finest teas colour the water the least. The finest of all, in Europe, the yellow tea which comes overland through Russia, obtainable at Frankfort, and well worth obtaining, communicates only a slight tinge to the infusion. These luxuries are best enjoyed with a slice of lemon in lieu of milk, and very little sugar.

In using tea, it must be remembered that the small-leaved and fine-grained tea packs much closer than the coarse, that consequently nearly double the quantity may be contained in a spoonful, and therefore fewer spoonfuls are required.

Coffee contains more of its special exhilarating alkaloid (Caffeine) than tea, but somewhat less essential oil. It should not be kept at the boiling point, or it loses this virtue.

The surest way to have genuine coffee is to purchase it in the bean, with the aromatic scent (which shows that it has been recently roasted) still in it, and grind it yourself. It is easy to add chicory if you think it improves the flavour, but as that root contains no alkaloid, the beverage is weaker in quality. This is desirable under certain circumstances, to be discussed in the second and third part of the volume. A further security is to buy the beans raw, and roast them at home over charcoal; the trouble is repaid by the delicious incense, which alone, among the operations of cookery, it diffuses through the house.

If you have an opportunity of getting it direct from the importer, you will find the best coffee is that from Guatemala. It is probably re-christened 'Mocha' in the shops. The smallest and roundest beans are the best. The long oval bean from the West Indies ought to be a good deal cheaper.

Cocoa and *Chocolate.*—'Cocoa nibs' is the most eligible form in which the plant can be used as a mere beverage, like tea or coffee. They are the seeds merely broken up by rough grinding. But much of the nutriment is wasted in the thick grounds; so that if what is wanted is a supporting food, either these must be well stirred up in the draught, or the extract of the seeds, 'chocolate,' must be used. This contains a large quantity of fatty matter and may be made a meal of.

Chocolate is an article so disguised in the manufacture that it is impossible to tell its purity or value. Indeed, the makers say it is improved by adulteration, and cannot be sold without. The only safeguard is to buy that which bears the name of a reputable maker.

Sugar.—The baser sort, 'moist brown,' always contains dirt, sand, and mites. If it is dissolved in warm water, the heavy dirt falls to the bottom, and the mites float on the surface, affording an interesting object for the microscope.

Grocers get from handling it *psoriasis palmarum* or 'grocer's itch,' so it can hardly be a desirable condiment to eat raw. Besides this, a clerical friend of mine was informed by a large and religious grocer in a manufacturing town, that he found it impossible to compete in price with his rivals, without adulterating intentionally the whole of his brown sugar. And he stated (not under the seal of confession) that one of the materials used for colouring, was a mineral of a deleterious nature, but he declined to name it, as, seemingly, in this instance cunning has advanced ahead of detection.

The obvious moral is always to use loaf sugar or sugar candy, the sophistication of which does not answer.

Treacle.—Common treacle is the waste which drains off from the moulds in which refined sugar is made. It contains a considerable quantity of dirt, acids, extractive matter of doubtful quality, and salts, so that it sometimes acts as a purgative. 'Golden drop' is prepared by filtering this stuff through charcoal; it should be clear and light in colour, and is then a wholesome article.

Grape sugar is used in England only to adulterate that from the cane; its sale might with propriety be prohibited. But, in Portugal, grape juice is boiled down with quinces into a sort of jam, the etymological ancestor of all the marmalades —whose name is derived from '*marmelo*' the Portuguese for a quince. Let not the reader be beguiled by a poetical regard for grapes or quinces into eating it. My specimen was a present direct from a country estate in the south, and tasted like gritty molasses and onions. The giver informed me it was very wholesome, but used only by servants and farm-labourers.

Raisins, *Sultanas*, *Currants*, *Figs*, and *Dates*, are the dried fruits preserved by their own uncrystallisable sugar. The *muscatel rasins* are the best, and are prepared by allowing the grape to dry on the vine; the inference from which is that expedients used to hasten the process are inexpedient. The best evidence of the goodness of these articles is their plump-

ness and softness, combined with the absence of mites, as tested by infusion in water, in the mode recommended for brown sugar. Mites are not known to be poisonous, but they destroy the saccharine constituents, leaving only feculent remains and exuviæ, and converting the remainder into carbonic acid. Now, it is for their saccharine constituents that we employ these dried fruits, both cooked and uncooked. It may be remarked, also, that the skins are very insoluble, those of all sorts of the grape containing a large quantity of white wax, which in fact waterproofs the texture, and prevents its penetration by aqueous fluid. So they should always be split before using in the kitchen. Cakes made of unsplit currants are especially to be avoided, as they are apt to produce pain and purgative effects in the most healthy.

Rice should be as whole and unbroken, and as free from dust and dirt as possible. The presence of weevils in it, constitutes a decidedly damaged article, which ought to be returned. In the future pages, when rice is spoken of in connection with puddings, the Carolina is intended; for curries, or as a vegetable with meat, the Patna is used, since it best retains its form when steamed. Patna rice is also the most eligible thing to eat with jam, or rhubarb, or roast apples &c., for it has the least laxative action of all cereals, and thus counteracts the inconvenient tendency in that direction of the sweet parts of the dish.

The preparations of *wheat* ordinarily sold by grocers, such as *Semolina* made from hard wheat rich in gluten, *Macaroni*, *Italian paste*, *Vermicelli*, made of flour from which the starch has been partially removed, are more nutritious than the flours of the corn-dealers; but, at the same time, are less digestible from their being dried up so hard. They are not suitable to be used as vegetable dishes, for they are too nitrogenous for the purpose. But, if they are long boiled till quite soft, they form a substantial meal. The worst sort of macaroni is that stamped in the form of letters, for if it be sufficiently

boiled, the shape of the letters is lost, and cooks do not like that.

These preparations are apt to get 'weevilly,' a state of things usually to be detected by the smell.

Vinegar.—The best vinegar is that made from the acidified white wines of the Loire and Charente. British malt vinegar is deficient in the œnanthic ether which gives a bouquet to the more elegant article, is more apt to become mouldy and to breed worms, and is more often adulterated. As to distilled wood vinegar, although its fundamental composition is identical with that of wine vinegar, yet it has not such a pleasant taste or smell as the latter, for the destructive distillation of the wood gives rise to some empyreumatic products of doubtful wholesomeness, of which traces always are to be found in the product.

There seems nothing gained by scenting and flavouring vinegars. It prevents their being analysed, and thus excites, perhaps, unmerited suspicion. They smell like lotion, which is unpleasant at dinner.

Vinegar owes its acidity to the acetic acid, which constitutes about a twentieth of its weight in French vinegar of good quality, and in British '*proof*' vinegar 4·6 per cent. of anhydrous acid. As to other substances contained in the solution, tartrate and sulphate of potash, tannin, and œnanthic ether appear to improve the flavour without in any way affecting the health of the consumer. But it is not so with sulphuric acid, with which bad vinegar is adulterated. Sulphuric acid—especially if cheap, impure oil of vitriol be employed—cannot be considered harmless if used in the daily food, in the preparation of cabbage, or pickles, or salad, or made-dishes. The more it is cooked, the more concentrated it becomes, for the acetic acid is driven off by the heat, while the mineral remains. The least injury it can do is to corrode the teeth, when present in excess.

To avoid sulphuric acid entirely is, however, not possible, unless you make your own vinegar; and this is really worth

the trouble if your consumption is large. For the law allows the manufacturer to introduce sulphuric acid to the extent of one part in a thousand (in France one gramme to one litre), and the article cannot be called adulterated if this amount is not exceeded. The test recommended by the College of Physicians for insuring the goodness of British vinegar used in the preparation of medicine is a solution of 1 part of chloride of barium in 8 parts of water: of this 10 minims will precipitate all the sulphuric acid in an ounce of lawful vinegar. If, after this has settled down, the test solution still continues to form a cloud, the article should not be employed in the preparation of food.

Besides sulphuric acid, cheap dirty vinegar sometimes contains lead and other metals. There was an epidemic of lead poisoning some years ago among the apprentices of a silk-mill at St. Albans, induced by pickled pork. This contamination is provided against in the Pharmacopœia, by ordering the test of sulphuretted hydrogen to be used.

Is it worth while to test or get tested such a mere condiment as vinegar? I think so, for it is really a most useful adjunct to the dietary. It possesses the property of softening and finally dissolving muscular fibre, as you may see by watching its action on a fragment under the microscope; and, in virtue of this solvent action, it is wisely taken with those meats whose fibres are hard, and from their hardness insipid, such for example as boiled beef, fresh pork, brawn, salmon, tunny, sturgeon, eels, lobsters, &c. The resolution also of the albumen in hard-boiled eggs is assisted by vinegar. Acids favour the conversion of cellulose into sugar, which is the first stage of the digestion of the materials for salad—of cabbages, and other green leaves—and their employment in this class of dishes is strictly physiological. On the other hand, to put vinegar on beans is, in the strong language of Monsieur Cyr, '*détestable*;'[1] for it renders insoluble the legumine

[1] Cyr, *Traité de l'Alimentation*, p. 143.

which is the most nutritious part of them, constituting, in fact, from a quarter to a third of their substance.[1] Cold boiled beans are sometimes made into a salad, and it is quite true, as M. Cyr says, that the addition of vinegar destroys the flavour, and, probably enough, makes it indigestible. Oil, pepper, mustard and a little white wine, make the best dressing. Beans are a favourite food for persons practising disciplinary abstinence, and the hint may be of use to them, though not appreciated by the unrestricted world.

Oil.—M. Cyr places olive oil as the highest in order of digestibility of all fatty foods,[2] even above fresh butter. But to merit that praise it must be thoroughly good, quite clear and transparent and free from rancid smell. The paler it is, the better. The white deposit sometimes seen is vegetable albumen, which ought to have been refined out, as it prevents the oil from keeping sweet. Lucca oil, which is the best, has a peculiar, agreeable odour, technically called 'nutty.' *Olives* gathered young and small are called 'French olives,' and in this condition are the sort most adapted, by their pleasant piquancy, for eating as a relish. But to use in cookery they are indigestible and tasteless, and inferior to the fruit gathered at a later period of growth, when soft and pulpy with incipient oiliness, and called 'Spanish olives.' These last, also, are best for salads. In Portugal, they refuse to gather them till they are just beginning to turn purple, and then they are bitter and not so digestible; but I am informed by a Portuguese country gentleman that they might be just as good as the highest priced French fruit, if the farmers would be persuaded to advance upon the traditions of their grandfathers.[3]

[1] In horse-beans 30·8 per cent., in Windsor beans 29·05 per cent., in haricots blancs 25·5 per cent.—*Payen*.

[2] *Traité de l'Alimentation*, p. 122.

[3] I take this opportunity of alluding to the trade custom of designating peculiar qualities or kinds of food by local names. No fraud is intended, and any legislation which would make the transaction a fraud, would be unjust. The words 'Spanish' and 'French' do not mean that the olives come from Spain or France, but that they are of the sort made in those countries.

Caviar should be soft, pale in colour, and exhibiting the ova of the roe quite distinct. When old and black, and homogeneous in texture, it is out of season and rancid, and arrests digestion. It is wise never to eat it when you see it served carelessly with cold, withy toast. It should be sent up in a toasted-cheese dish.

Pickles.—Grocers appear to consider that the final use of pickles is to ornament shops: so they choose them for the brilliancy of their colours and the elegance of the arrangement of their contrasted forms in the bottle. The consequence is that all sorts of expedients, some of them highly deleterious, are used by manufacturers to enhance 'the fatal gift of beauty.' In twelve samples of pickles taken indiscriminately and examined in behalf of the State Board of Health of Massachusetts by Mr. Hill, last year, ten were found to contain copper by the simple process of dipping in them a steel knitting needle, which in a few hours became coated with the metal. Nine of the samples were also examined for alumina, and found to contain it, showing that alum had been used, probably to intensify the lake tints. (Fourth Annual Report, Boston, 1873).

Black pepper in powder is another article which the conscientious grocer, lately mentioned, declared he could not sell at a profit without increasing its bulk by artificial means. It does not, however, appear that any of the dirt introduced is to the knowledge of the adulterators deleterious to health. The simple safeguard is to buy the pepper in corn.

Red pepper when pure is entirely suspended when rubbed

A large quantity of 'Ostend rabbits' used to come to the London market from near Marseilles, but an importer told me they were bred, fed, killed and skinned like 'Ostend rabbits,' and therefore to all intents and purposes 'Ostend rabbits.' So a wine-merchant that sells his prime claret as 'Château Margaux,' is committing no fraud, if his wine is as good as Château Margaux, though it might be proved to have never seen that famous property. Furriers are in the habit of calling tabby-cats' skins 'Japanese lynx,' and the best 'plover's eggs' are usually laid by gulls on the East coast: in neither case is there any intention to deceive.

in warm water. If a red deposit falls, it is generally red lead, a noxious metal.

Mustard is usually adulterated by the grinders with flour and turmeric, which are not injurious to health, so that the verification of the drug becomes a question for the economist, not for the dietician.

Spices, in general, should not be purchased ground. And it is a prudent proceeding for members of our profession to take the opportunity offered them by the liberality of the Society of Apothecaries, and lay in, at the wholesale market price, a stock of the purest and best spices. They have, thus, test articles which they can compare with those furnished in 'our village.' It will sometimes be found that the latter, even with the grocer's profit on them, are the cheapest; and then of course they must be adulterated or damaged goods.

Bacon and *Ham*, when properly prepared and not rusty, give us a fat much more digestible and therefore more nutritious than that of fresh pork. The process of salting, and still more that of slowly drying or smoking, removes a great quantity of the water, and coagulates the serum, which tend to make the adipose matter readily run into rancidity. What we have to do in selection is to see that the removal of water is carried as far as possible, and this is accomplished by observing the loss of weight in cooking. Primest bacon, according to Dr. Letheby, should not lose much above a tenth in boiling; and ham wastes much less.

Sausages.—After the sensational descriptions of their manufacture, sent to journals by special correspondents, it may be presumed no one eats sausages, without some aquaintance with the person who has prepared them. There is, or was, in Oxford a large open window through which one could see a stalwart maiden, with her arms glowing from frequent immersion in cold water, chopping and stuffing these savoury viands; and I have a lively recollection of the pleasure with which I welcomed them afterwards on the breakfast table. I have often thought since of the scene, when hearing the chopping

machine going, in cellars and back premises in London, and have wondered that some honest maker has not taken the course of giving confidence by publicity.

'German' sausages are of unknown composition.

§ 7. Dairy Produce.

Milk.—To people who do not keep their own cows, the purchase of milk is a matter of extreme importance, so much of it is used in every well-managed family, and so sensitive to noxious influences are the junior branches which are its assiduous consumers. But it must be confessed that to the exclusion of the noxious influences liable to be conveyed in milk, science affords very little help. There are machines for taking the specific gravity, of which the most convenient is the hydrometer sold by surgical instrument makers as a urinometer. And there are machines for measuring the quantity of cream, of which that generally used is the lactometer, devised by Sir Joseph Banks, a tall test-tube in which the cream rises to the top, and is simply measured.[1] And for more accurate estimation we have Vogel's Galactoscope, in which instrument the quantity of cream is calculated by the degree of opacity caused by the thickness of a layer of milk necessary to obscure the light of a candle. By this, we may guess whether our milkman has put much or little water into the can, whether he has intentionally cheated us by selling the produce of the pump as that of the dairy; but that has not much, if any influence on the appropriateness of the milk for food. If less strongly nutritious, diluted milk is quite as wholesome as undiluted, and more easily digestible. The cases which call for the use of such measures of commercial value are those of public institutions, such as hospitals, prisons, workhouses, where it is our business to make sure

[1] Is it too late to revise the barbarous title of this instrument, and call it (say) the 'Cream-reckoner'?

that the poor persons towards whom we occupy a paternal position are not defrauded of the limited nutriment supplied to them. If the milk comes from starved animals or from the pump, they ought to have more of it in just proportion.

The real poisons whose possible presence throws a dark shadow over the enjoyment of this delicious drink, are quite independent of its richness or the reverse. They are those arising from an unhealthy condition in the cow, or in the human dwellers in the dairy, or from gross carelessness in keeping its produce. After calving, the udder yields a thickish yellow fluid, somewhat stringy and greasier than ordinary milk, slightly reddening litmus paper.

Till this has ceased to be secreted, whether the period is a day or two, or as many weeks, the milk has a purgative action when raw, and even when boiled and made into a pudding, as is the custom of some parts, is of doubtful wholesomeness. An admixture of it in the dairy produce may be detected by skilful microscopic examination, which shows the presence of colostrum corpuscles. The best way to exhibit them is to mix some water with the colostrum, let it stand a few days till the cream has risen entirely, and then collect the sediment from the bottom of the test-tube, which will be found to consist entirely of them. Their measurement, according to Mandl, is about $\frac{8}{4000}$ of an inch in diameter.[1] Colostrum is apt to coagulate the milk like rennet.

Of more serious importance is the presence of inflammatory or febrile disease in the cow. It is known by the appearance of blood or pus in the milk, but more readily by the sickening odour which exhales from it. If this is accidentally swallowed it disagrees strongly with the stomach, and if the disease is infectious, it may very probably be communicated in this way.

A more likely way, however, for disease to be induced through milk, is its contamination during its transit from the cow to the customer. Where inmates of the farm have been

[1] Dr. J. Davy in *Med. Chir. Transactions*, xxviii. 82.

affected by typhoid fever, the infection has been carried to the families in the distant town supplied from that quarter. It is just possible that the germs of the malady may have settled in the milk from the air; but a more probable supposition is that the subsoil water, and so the wells, had become contaminated with the morbid secretions, and had been used in washing the milker's hands, the pails, and pans of the dairy. In a recent notorious case, occurring in London in 1873, this seems to have been fairly proved to be the path of the invasion of typhoid; but it would not have been proved had not Dr. Murchison taken up the investigation with extraordinary energy and perseverance. This danger is unhappily not capable of being warded off by science. The fatal substance which brings typhoid fever into our bodies cannot be distinguished from other organic matters, nor can its existence be made evident by any chemical or microscopic observation. By its works alone, and too late, do we know it. The only possible protection lies in the scrupulous observation of dairy farms by sanitary inspectors, to report on any communication between the drains and wells, and instantly to warn the customers, if the farmers refuse to stop the sale of dangerous milk as human food. It would be a good plan for the customers of any one establishment to appoint their own inspector.

The evidence of the transmission of scarlatina by milk, is not so conclusive as in the case of typhoid.

There are no other impurities injurious to health known to exist in the milk of our shops: caramel, brown sugar, salt, and carbonate of soda have been detected,[1] but not the chalk, starch, brains, or other substances sometimes asserted to be employed as adulterants.

Milk is sometimes rendered unwholesome in the customer's own house, by the vessels in which it is received not having been properly scoured out with soda. On stale milk, even in minute quantities, there very quickly germinates a blue

[1] *Fourth Annual Report of the State Board of Health, Massachusetts*, 1873, p. 295.

mould, such as is seen often on cream cheese, and called *Didium lactis*. The mixture of this, adhering to the corners of the can, with the fresh milk, causes it to turn sour, and to give rise to colic and diarrhœa, and, it is not unlikely, also to 'thrush' in children, for the crust which forms in the mouth is not a dissimilar form of mould.

The purity of the milk supply is a matter of extreme importance, and fitly forms the subject of legislative interference, provided always that the legislative interference be judicious and does not impede improvement by competition.[1] It is a subject of pre-eminent importance to the healthy, above all others. I always feel indignant when I see advertised special milk, in sealed cans or otherwise, for the nursery or for invalids. As if the health of the sick and weakly were more important than that of the strong man, on whose arm those sick and weakly depend for existence. Let us keep our strong men well, and we shall have fewer invalids to attend to. In choosing between two shops, I should always prefer the one that did not advertise a special article.

Cream, when good, is thick, clouty and yellow.

Buttermilk is one of the most wholesome summer drinks possible. It is equally refreshing and nutritious, and to see it given to pigs instead of being distributed to the neighbours makes the philanthropist's heart bleed.

Whey from which the curd has been removed for the purpose of making cheese, is apt to be somewhat sour, from the rennet by which coagulation has been effected. But even then it is a pleasant summer drink, and is certainly very digestible, and rapidly absorbed, for it is in composition more like *serum sanguinis* than anything else. A grate of nutmeg makes it very palatable. In Switzerland it is often drunk as

[1] Of such injudicious sort would be, for example, the fixing an absolute standard of cream contents. The standard must be low, or much genuine milk would be condemned; and then when any dealer got milk richer than the standard, he would water it down to the mark, and thus the pump would be more active than ever.

a diet drink, and the inhabitants have such a high opinion of its wholesomeness, that they have founded establishments for the special purpose of receiving patients for the cure of all sorts of diseases by its means. This 'Molken-Kur,' as it is called, does not however seem to suit English constitutions, unless starvation is required to be the principle of treatment, as is rarely the case.

Junkets and *Curds* are nutritious nitrogenous foods, but they require the stomach to be educated by use for them to be well borne in any valid quantity. Milton's mention of 'the junkets' seems to imply that they were formerly more of an ordinary diet in farm houses than now.

Condensed or '*Swiss*' milk is a device for avoiding the risk of deterioration by shaking. Six-tenths of the water is dried out of it, and sugar is added as a preservative. It certainly is digestible, as is shown by the fact of infants brought up by hand upon it growing fat, and apparently strong, a fact of which most of us have ocular proof. Great care should be taken that only the softest water is used for its solution, and precautions taken against its adulteration. As it is a recent invention it is pure enough at present, but extensive use will probably teach ingenious methods of sophistication.

Clotted cream is simply cream skimmed from heated milk. Great accuracy is necessary to secure the right temperature, yet the union of the offices of cook and dairymaid which it entails does not ensure accuracy. If the mistress of the household will make it a few times with her own hands, she will find no difficulty in producing a digestible article by observing the following precautions, and for very shame her example will be imitated.

Clotted cream is simply cream raised by heat, so that a little albumen is partially coagulated along with it. Take a well-scoured stout saucepan (a broad copper one is best) and put a teacupful of quite cold water in it, then pour in the whole milk and heat it over a very slow fire (charcoal is best)

till the cream rises; when it does so, take care not to increase the heat, but keep it up. It should never exceed that which the finger can easily bear (about 150°). As the clot rises, divide it down the middle with the finger, and turn it back on itself. Keep doing this till there is no more formed. A *bain-marie* and a thermometer are a refinement upon this method.

Bought clotted cream is apt to make the delicacy unpopular. It is often sour, and adulterated with sugar and flour.

Butter, like milk, is adulterated with an excess of water, which may be detected by boiling; the oily matter floats, and the water underlies it. But neither in that, nor in any other detected falsification is there any source of danger to health. Even when rancid and damaged butter is got up again in order for the market, the processes are such as to make it fit for food, though not so nice as when naturally sweet. The palate is a good guide; but sometimes in autumn and winter, when the grass is scanty, the butter will be flavoured with the dead leaves or turnips which stingy farmers will let their cattle eat, and we must not condemn the article as unwholesome because it is nasty at these times.

Cheese.

Classification of Cheeses usually in the Market.

Cream cheeses	Gruelthorpe. Neuchâtel.
Cheeses made of whole milk rich in cream	Stilton. Double Gloucester. Roquefort. Gorgonzola. Cheshire. Cheddar.
Cheeses made of poor or partially skimmed milk	Single Gloucester. Shropshire. American. North Wiltshire.
Cheeses made of skimmed milk . .	Suffolk. Parmesan. Dutch.

Cheese is required for two purposes; one is for eating in small quantities as a fillip to the palate, and the other is in order that it may serve as a substantial food. For the first purpose it may be produced in a rancid, decayed state, and is best when of a rich buttery sort. But to be taken as a meal, to satisfy hunger, newer cheese is better. Poor cheeses, such as the Dutch, are wholesome and digestible if cut in very thin slices and buttered. Toasted cheese is also digestible if it is new and lightly cooked with cream and butter. Tough toasted cheese is about as soluble as leather.

Eggs.—To choose eggs, dissolve one ounce of common salt in half a pint of water, that is, ten fluid ounces measured with a medicine measure glass. In brine of this strength a good egg will sink, a bad egg will float. If held up to a candle a fresh egg will be found to be more transparent than a stale one, or than one with a chicken in it. Fresh eggs are most transparent in the centre, stale ones at the end.

If absolutely necessary, eggs may be preserved some time by rubbing them well with fresh grease when taken warm from the hen-house. But if they acquire a smell of old straw they are unfit for food. Lime gives them a peculiar taste, and prevents the albumen setting.

Rennet.—Rennet is not always to be obtained good in the country. It may be thus prepared for domestic use in making whey, junkets, &c. Take a calf's 'bag' with the curd in it (that is the fourth stomach, or abomasus,[1] filled with acid chyle), pick out all the hairs, and wash bag and curd clean. Then, replace the curd in the bag with six or seven ounces of salt, and set them by for a week in a cool dairy. Then, take a strong brine, made of a quart of water to a pound of salt, and pour it cold on the rennet. When it has stood again for a week, the liquor is fit for use.

[1] It is figured in a volume previously referred to, *Dalton's Human Physiology*, p. 105.

§ 8. Bread Stuffs.

There is no bread so digestible as that made by an honest, experienced baker. In baking at home you secure the honesty, but you lack the experience. The chance has to be taken of a bad batch through some accident; and then the best must be made of it till it is finished.

If one had to live on bread alone, brown bread would perhaps be preferable, for (as Professor Liebig taught us) it contains in the bran and pollards, which are returned to it after grinding to make it brown, a considerable quantity of phosphate of lime, valuable as nutriment to the bones and other tissues. But the fact is, most of us take in other ways plenty of phosphates in a more digestible form than bran, and the irritating effect which it has on the bowels shows that it is not, in this form, made much use of by them as a nutriment. White bread is generally chosen in preference by shrewd working men who wish to make the money spent on food go as far as it can. It is also far less likely to be withy and tough, and is less often adulterated.

Not but that some admixture of the bran is pleasant, both to the eye and to the palate, as in the flour which is called 'seconds,' which makes a very good bread, probably in consequence of this flour not being over-ground. Too much friction ruptures the starch granules, and the dough does not rise well.

Bread should be evenly porous without any large holes, like a fine sponge. The texture should be firm, of which virtue the best test is the being able to cut it up into thin bread and butter. Tough, clammy, new bread becomes wadded together into an insoluble mass by chewing, is not penetrated by the saliva or gastric juice, ferments anew, and even in strong persons is apt to produce a disagreeable form of heartburn. If from necessity it *must* be eaten, heating and

copious buttering, as we heat rolls or crumpets, is the best expedient to make it as digestible as circumstances admit.

A considerable portion of water quickly evaporates from hot bread, causing of course a loss of weight, so that bakers will sometimes try to prevent it by covering up the loaves from the air. The crust is thereby rendered withy, and the crumb is wet and tough, besides which you are buying water at the price of bread.

There is another and more objectionable way in which the loaf is forced to hold water in excess, that is the addition of boiled rice-flour. It is a sticky gummy paste, which renders the dough more adhesive, and prevents evaporation. So that 21 quartern loaves are made with what ought to make only 20. They may be found out by their sodden bottoms, the water gravitating by standing. To shirk this test, bakers will turn them upside down on the shelves, which always looks suspicious.

I am told by a retailer of glue that bakers buy a good deal of that substance, and the inference is that it is used in the same way to make the dough adhesive.

It is said, also, that alum is added for the same fraudulent purpose, even to good flour. But its object, generally, is to make a damaged article bear a good white colour, and stop the excess of fermentation to which it is liable. Alum is easily detected in the laboratory by incinerating the bread suspected to contain it, and our analysts are active in this direction. However, they must guard against being too pedantic, and a distinct line must be drawn between a baker who habitually uses a great quantity of adulterant to dispose of flour which he has wilfully bought in a bad state, and one who now and then rectifies an accidental loss of goodness by the employment of the drug. But certainly, the less alum he uses, the more he is to be trusted.

The best bread grows stale the slowest. 'Aërated bread,' where the dough is raised according to Dauglish's patent, by forcing pure carbonic acid into it, keeps better than any. It

is free from the objectionable presence of the remains of the yeast, not to be avoided otherwise, and is more certain to be wholesome than ordinary bread. It is popular, too, at that test of palatable simplicity, the nursery tea table.

Yeast is a great difficulty with those who bake at home. Brewer's barm is the best, but it is apt to go dead between one baking and another, and is not easy to be got. Country tradesmen object to sell it, but many retail bakers in London will engage to send regularly by post an ounce or two of 'German yeast,' which thus arrives quite fresh and active. An orderly cook can keep a ferment in constant action by starting it with some 'German yeast' from the regular manufacturers of that article, and feeding the mixture, placed in a cool situation, with some fresh malt and mashed potato or dough, daily.

An acquaintance with the theory of fermentation as explained in all books of physiology, and recently made doubly instructive by the researches of M. Pasteur, will enable an educated person to point out the remedy for all difficulties encountered in the kitchen. There is no more favourable subject for interesting unlettered minds in nature's wonders. I have seen a country congregation quite breathlessly attentive to an account from the pulpit of the recent addition to our knowledge on this head; and I am sure that when their dough has risen well, they have remembered the moral impressed upon them.

Biscuits are too hard for ordinary consumption as a bread stuff, if made from flour and water only, as 'captains' and 'ship biscuits' are. They are very useful, however, to travellers, in readiness for those frequent occasions on which the bread is tough, sour, bitter, or otherwise uneatable. They bear well exposure and rough treatment, and if soaked for a few hours in water or milk, they take up several times their own weight of fluid, soften and swell, and with a little cream and sugar make a dainty dish of eminent digestibility. Biscuit powder for infants should be made from this kind.

Fancy biscuits are too numerous to describe, and of various merits. The addition of milk, sugar, eggs, flavours,

&c., makes them less digestible than the plainer sort. Those made on a large scale by special manufacturers are the best, because in them the partial raising of the dough is effected by plain carbonic acid, instead of carbonate of ammonia.

When biscuits become damaged, they are often damped and heated anew in the oven. They quickly lose the artificial newness thus acquired, and grow stale and musty. So they are safest purchased in tins, where they are not so likely to be tampered with.

Oatmeal.—The coarsely ground Scotch oatmeal is the most suitable both for porridge and cakes. If imperfectly boiled, as when prepared in a hurry, or intentionally unboiled as in brose, it is extremely indigestible, and produces the most obstinate cases of pyrosis in the parts of the country where it is habitually used. But when well boiled, and eaten slowly so as to become well mixed with saliva, it is a most wholesome as well as most nutritious food. An oaten diet has bred the Scotch farmer and the English horse, and where will their equals be found?

Emden grits are the best adapted form of oats for gruel.

Barley and *rye* do not appear to possess any distinctive virtues which can give them an interest in the eyes of a medical man. Though useful when other cereals are not to be got, they are inferior to them in solubility and nutritive power, and, at the same time, have not the attractive taste which would cause them to be a temptation against which a warning is necessary.

Maize in various forms is often recommended as a valuable food. It contains a good deal of fattening matter, and on that account is used for fattening geese at Strasburg, and other domestic animals elsewhere. But its oleaginous constituents incline it readily to grow rancid, when it has a fusty disagreeable smell. When stale, therefore, it is apt to disagree, and in horses often causes a sort of eczema of the skin. To our race, damaged maize, persisted in as a food, is still more deleterious, producing, for example, in Lombardy and the

Valtelina, a special endemic cutaneous disease—Pellagra—which is year by year slowly widening its fatal shadow over the finest lands tilled by man.[1]

Maize flour may be refined and made safer by washing out the nutritive portion with alkalies, and in this state professes to constitute 'oswego,' 'maizena,' 'corn-flour,' &c. But the eater should understand that he has before him starch only, and must not reckon on it for nitrogenous nutriment. The economist will probably think he can buy starch cheaper in the form of rice flour, which, indeed, is often sold under these fancy names, according to the evidence of Dr. Bartlet before the Adulteration Committee this summer.

Other forms of Starch commonly sold.

Arrowroot (West Indian best).
Cassava meal.
Potato starch (uncoloured).
Sago (unbleached best).
Sago meal.
Salep.
Tacca starch, or 'Otaheite Arrowroot.'
Tapioca.
Tapioca meal, or 'Brazilian Arrowroot.'
Tous-les-mois (West Indian).

The only preference that can be given to one of these over the other depends upon its flavour. All are equally wholesome, and equally suitable for the occasions when a physician wishes to administer starch without admixture.

[1] The Pellagra is the punishment of sin. The farmers, cultivating their lands on the metayer system, the landlord and tenant dividing the crop, are tempted to hide some of the grain in holes and corners, where it gets mouldy. They find it makes their fowls ill, so they eat it themselves! See Lombroso, *Sulla Pellagra*, where figures are given of the peculiar mould to which the author attributes this very serious plague.

§ 9. Alcoholic Drinks.

Wine.—This is a subject terribly overladen with literature, historical, poetical, industrial, scientific, and occasionally nonsensical. So that a simple purchaser who wants to know how to get a good wholesome glass of wine, has no small difficulty in winnowing out the required information from so much chaff.

The first thing a householder should think of before he stocks his cellar, is—what he wants the wine for. Is it to take as a regular beverage, or on festive occasions only? Does he intend to employ it for himself or others as a medicine, or to drink it only because it is nice? Here are the four chief uses of wine, and different wines are suitable for each.

As a regular beverage for a healthy person there is no wine in the English market equal to claret. The intelligence and perseverance of the Bordelais vintager, improving yearly on the traditional experience of centuries, does the best that can be done for a very good grape. Nothing can be more perfectly made than the greater part of the low-priced Bordeaux wine, now brought over direct from the Gironde.

Everybody distinguishes in the grape three parts, viz., the pulp, the stones, the skin. It is on the forms and degrees of pressure exerted to extract the juice, that the presence of these several parts in different proportions in the wine depends. In the pulp is the syrup, which ferments into alcohol, the amount of which constitutes the value of the wine. So as much of that as possible is got out. In the stones are essential oils, which in delicately graduated moderation are wanted to contribute to the formation of vinous ethers as a 'bouquet.' In the skin and stalks is tannin, necessary to give astringency and preserve the liquid from mouldiness; and there are also colouring matter and extractive, which contribute a distinctive hue, a thickness or 'body,' and fruitiness. There are, too, in the juice, tartaric acid and its salts in considerable quantity, and citrates and malates in smaller amount: these are rather

necessary evils than desirable ingredients, and the owner is glad to see his must deposit the greater part of them in the '*tartar*'—a product of the vintage for which he expressed his dislike by the bad name he gave it in the old days of strong language.[1] There is also some nitrogenous matter, which in undergoing chemical changes acts as a ferment, and having done its work, ought to disappear, lest it should re-establish fermentation when not required. Now, the perfection of claret, above all other wines, consists in the manufacture being so conducted that each of these elementary constituents of the grape is expressed in exactly the proportion most conducive to the wholesomeness of an alcoholic beverage.

If any of the above-named ingredients, or their products, exhibit themselves conspicuously in the perfected liquor, a peculiar character is given to it, which causes it to be sought out for real or supposed advantages, or avoided for real or supposed evils. We can, thus, classify wines as they appear in the market, in the following groups:—

1. *Strong dry wines.*—In these the syrup of the must has been in large proportion, and has fermented thoroughly into a large proportion of alcohol.

2. *Strong sweet wines.*—Here the sugar has either existed naturally in such excess, or, more commonly, has been added in such excess, as to stop fermentation and remain sweet.

3. *Aromatic wines*, whose chief feature is a delicate diffusible odour comparable to that of flowers, and thence termed '*bouquet.*' This depends on the union of sundry essential oils with the alcohol in a nascent state, by which œnanthic and other volatile ethers are produced.

4. *Acid wines*, whence the natural acid cannot be eliminated without destroying the flavour. The acid in them is mostly tartaric, and not acetic, as in wines that have turned sour.

5. *Sparkling wines.*—Here the ferment is not allowed

[1] *Sal Tartari* = 'hell-salt:' *Cremor Tartari* = 'hell-scum,' cream of tartar. The history of the word is not known, but Paracelsus found it in use in his day.

entirely to exhaust itself before bottling, so that it goes on slowly under severe pressure, and saturates the wine with carbonic acid, at the same time giving birth to flavours which would not otherwise be produced, and to very exhilarating ethers, without much alcohol.

6. *Perfect wines*, where as many of the above qualities as possible are combined without interfering with one another.

7. *Rough wines*, in which the astringent tannin is predominant.

1. *Strong dry wines* are well represented by sherry, which is the strongest and driest of all; and it is ably supported by Port, Madeira, Marsala, Johannisberg, and a few (very few) others of the products of Northern grapes. These all contain too much alcohol to drink dietetically; much diluent must be taken at the same time to make them wholesome. But for festive use, to take a glass thereof to promote conversation and good fellowship, they are excellent. And, except Marsala, they are well qualified for that post by agreeable flavour.

Constant use of strong wines induces a congested and insensitive state of the gastric mucous membrane, which prevents its glands from secreting freely, and, by reflex action, affects also the salivary glands; these liquors are absorbed slowly, and what sugar remains in them, and much of the alcohol also, becomes converted into acetic acid, which fermentation further causes the oleaginous ingredients in the food to become rancid. Thus is generated 'acidity' of stomach, or the presence of an undue amount of nascent acids. A gouty constitution is often thus inaugurated in a previously healthy person, and, what is worse, is capable of being transmitted as an heirloom, just as acquired peculiarities are handed down to their descendants by domestic animals.

2. *Strong sweet wines* are represented in England by Malaga, Alicante, Constantia, Tent, Tokay, Paxarete, Malmsey, the exported Lacryma Christi,[1] Frontignan, Lunel. They are

[1] That used for home consumption is a badly made wine which will not keep till it is ripe. The choicest Lacryma goes to Augsburg.

fit to drink only in small quantities, and are best appreciated, with a plain biscuit, when the stomach is not full. Thus taken they are a wholesome substitute for tea.

In order to enhance their flavour and bouquet, the naturally dry vintages are often, either during the manufacture or afterwards, made sweet. The most usual and least objectionable process is checking the fermentation by the addition of boiled grape-juice, and the result of this is an indubitably less wholesome article. By long cellaring the sweetness slowly disappears, and the fine flavour remains; but there is much risk of decomposition, which has to be guarded against by adding an excess of alcohol. Almost all the port now to be had is an artificial wine of this sort. The port drunk by our grandfathers, and up to 1820, was a dry, well-balanced wine, capable of being kept without brandy and without damage for several generations. I have, in Portugal, tasted some perfectly sound, which had been in a private cellar upwards of seventy years. But the summer of 1820 was an extraordinary one, and produced, in the Peninsula, a vintage such as had never been seen before, and the wine, by a preternatural richness of flavour secured a fatal popularity. Since then, the sole ambition of the Oporto merchant is to imitate 1820. He has more or less succeeded, but at the expense of British digestions.

3. *Aromatic wines.*—Several of the before-mentioned have a fine bouquet, but what are intended here are such as are chosen for their aroma almost entirely.

Moselle, the choicer Rhine wines, first quality Chablis, Château Yquem, several Italian wines (such as Orvieto, Monte Pulciano, Capri, d'Asti), Champagne, are of this description. They bear carriage badly, and have to be prepared for the voyage by artificial additions. So that, while wholesome in their native land, they are apt to be much the contrary as found here, and besides have often lost their aroma unless they are brandied.

4. *Acid wines* must be in justice carefully distinguished

from wines which have turned sour. The acid of the latter is nascent vinegar, whose presence indicates the probability of other more noxious accompaniments of decomposition being also in the damaged liquid, such as poisonous moulds and fungi, for example; but some wines are really made with an excess of acid, consisting mainly of the tartaric and its super-salts. This happens mostly to the growths of cold countries, such as the Rhine districts, and the environs of Paris. White Burgundy wines (of which Chablis is the best known) and white Bordeaux wines (Sauterne), unless in exceptional years, are more noted for their acid than for their aroma. They are best adapted for taking with rich, greasy dishes, and suit well the dietary of the luxurious districts where they are grown. They are an agreeable adjunct to the usual ingredients of salad dressing.

5. *Sparkling wines.*—Champagne, St. Péray (from the Rhone), Seyssel (or 'Swiss Champagne'), Sparkling Moselle, Vino d'Asti, are the best known. Good champagne is by far the wholesomest, and with a minimum of alcohol, possesses remarkable exhilarating power, from the rapid absorption of its vinous ether diffused by the liberated carbonic acid. *Silléry mousseux* contains, according to M. Cyr's table, only from 9 to 11 per cent. of absolute alcohol, but to a sinking fever patient, a glass will give twice the energy that can be obtained from a glass of brandy. The other effervescing wines will be drunk only by those who are reckless or ignorant of consequences.

The test of a sparkling wine is to leave it uncorked. If it be vapid after twenty-four hours, it is bad, and it is good in direct ratio to the length of time it retains its sparkle and aroma. That which roughens the teeth should never be again tasted; it is made of cider and rhubarb stalks; the roughness is from the malic acid it contains.

All these five classes of wine prudence will reserve for festive purposes and occasions; the wise man who wishes to

enjoy life, will make them always exceptional, for as idlers have no holidays, so perpetual feasters miss all the pleasures of variety; but I am quite sure that the not infrequent manufacture of occasions for domestic rejoicing, a birthday, a wedding anniversary, a harvest home, a horse sold, the planting of a tree, the calving of a cow, a daughter presented at court, or cutting her first tooth, or any other good stroke of business, is a great promoter, not only of love and happiness, but of personal health. Let the beverages which celebrate the occasion be chosen for their peculiar and exceptional flavours. If they are good of their class, the moderate use will not shorten, but both cheer and lengthen life.

6. *Perfect wines.*—By this term are intended such as possess the virtues derived from the presence of alcohol, of water, of sugar, of etherial flavours, of fruity extractive, and of acids, without any of them being so predominant as to mask the others, or to require artificial additions for the preservation of soundness and flavour. An enormous acreage is devoted to the production of red wines of this character in the department of the Gironde and other places in France of similar climate. We give the name of 'claret' to the whole of them, which is better than pedantically endeavouring to affix geographical distinctions. One of the merchant-princes of Bordeaux, a statesman of the highest integrity, gave me some years ago a hint which I have found of the greatest service in the diagnosis of wine-dealers. 'When,' said he, 'a tradesman offers you, at anything but the very highest price, our wines with the name of an estate attached to them, he is giving currency to a deception. If he uses the terms of First, Second, and Third Quality clarets, it is so-far-forth an evidence of honesty.' The wholesale houses and brokers buy up from farmers, many of whom do not make half-a-dozen hogsheads a year, all but the small quantity which is kept to store as 'vintage' wines, *vins de luxe*, and indeed much that is quite equal in quality to these speculative articles. The produce is mixed under the superintendence of cellarers, who at Bordeaux

form a sort of hereditary caste, handing down their secrets from father to son, and adding fresh knowledge—

> 'Till old experience doth attain
> To something of prophetic strain.'

The mixed wine is classed as *première*, *seconde*, and *troisième qualité*, not from any comparative superiority in wholesomeness, but according to the price it will fetch in the market. Thus, a much better general result is secured than if it were kept separate, as is to a considerable extent done on the Rhine.

If an exporter wishes to pass off some of this blended liquid as the production of some special vineyard, he accomplishes his object very often by adding an artificial scent. If he wants to sell (say) Château-Latour, he uses nuts or almonds, or something which smells like them; if his ambition leads him to aim at Château-Lafitte, he adds a whiff of violets also; if Léoville be his object, violet alone is probably enough. Others seem flavoured with cherries. When the wine is originally good, it is not likely that its wholesomeness can be seriously interfered with by this fraud.

But the same cannot be said when imperfect wines, not tempered by admixture, or damaged wines, are cured and fortified for export with flavours, and body, and alcohol. The fault of the two former is not so much that they are actively deleterious, which is not known to be the case,[1] as that they

[1] The substances sold by adulterators and druggists for flavouring alcoholic liquors are, according to Dr. Hassall, cocculus indicus, grains of paradise, capsicum, ginger, quassia, wormwood, orris root, carraway and coriander seeds, orange powder, liquorice, honey, sulphuric acid, cream of tartar, alum, carbonate of potash, hartshorn shavings, nux vomica, gentian, chamomile, tobacco, opium, juniper berries, angelica root, and bitter almonds. The quantities used of the active drugs are infinitesimally small, and would be nauseous if employed in noxious doses. In a trade circular headed *Important Information for Practical Men*, Eichler's *Receipts for Liquors* teaches how to use also 'tincture of green tea,' 'raisins,' 'figs,' 'St. John's bread,' 'rhatany,' 'catechu,' 'elderberry, cherry and huckleberry juice,'

hide the nauseousness of an unwholesome article; and the same might be asserted of the alcohol, if it were inserted in the form of ripe French brandy, but the price of that would diminish the profits too much, and new corn or potato spirit, full of the poisonous oil of grain (amylic ether), is used.

Against the adulteration of claret which does not pretend to be anything else than 'first,' 'second,' or 'third' quality, we have the valuable safeguard of the enormous quantity that is made, and the small profits which could be got out of the labour and risk of adulterating it.

The commoner Burgundies and the red Rhone wines run our claret very hard in the race for perfection; they err in containing too much fruity extractive, which, except the wine happens to be very strong in alcohol, causes decomposition. They do not keep well, and must be drunk off directly they are ripe, or they become unwholesome; but it is only just to say that they are much improved lately, and there seems little doubt that the scientific advice of M. Pasteur and others is calculated to improve them still further. The cause of unwholesomeness in Burgundy is usually the re-establishment of fermentation, through the formation of mouldiness in the bottle. To detect the presence of this destructive action, cork lightly down about two thirds of a bottle of the wine, shake it well for half a minute or so, and let it stand: if there is any carbonic acid set free, so as to expel the cork too readily, the Burgundy is unwholesome, and it will, if drunk daily, produce feverishness, tension of the eyeballs, throbbing of the arteries, dry furred tongue, and indigestion.

The grand, old-fashioned vintage Burgundies, such as Chambertin, Clos Vougeot, &c., do not produce these effects, as they are sufficiently alcoholised not to decompose; but their

'brown sugar,' 'yeast'—and so far we know what we are about. But as much cannot be asserted when we take in hand a mysterious 'wine colouring,' and still less when the ill-omened name of 'body preparation' is given to one of the drugs recommended. (*See Report of State Board of Health of Massachusetts*, 1873, p. 167).

price and their strength fit them only for holidays. They should be treated like port, and taken in a single glass with some exceptionally prime dish, such as venison or a saddle of four-year-old mutton. The primest Burgundies are those which have a peculiar odour of wall-flowers.

Beaujolais was introduced a few years ago from the Mâcon market by means of some choice specimens, but it has not sustained its first reputation. It is apt to turn sour, and at the best has very little bouquet.

The Hungarian wines have been lately widely advertised as superior to claret. Some of them have certainly pleasant fruity flavours, but they do not ripen well in the cellar, and are liable to decomposition. They are inferior to the produce of French vineyards at the same price.

7. *Rough wines* owe their character to the relatively large proportion of tannin which they contain. They have usually a brilliant tint, but are deficient in alcohol; and their principal use in the trade is to mix with others to impart colour and keeping qualities. The Vin de Cahors and Roussillon come under this category; the latter, being stronger in alcohol than the majority of rough wines, appears in the markets in its own name; at the merchants', and in public houses, as 'Burgundy Port.' In M. Cyr's table it is stated to contain 16·68 per cent. of absolute alcohol, as against 17·63 per cent. assigned to sherry, and 20 per cent. to port. The ordinary drink of the population in wine countries usually consists of these rough beverages; but, however beneficial they might be, which is questionable, it would be useless to recommend them to those who can procure something more palatable.

Beer.—The only thing to be guarded against in malt liquors is sourness, which needs no comment.

Spirits.—This is, in every respect, the worst form in which alcohol can be habitually consumed. To continue to produce the desired effect it is necessary to continuously increase the strength or the frequency of the dose. Almost all the cases

in which injury to physical health has been traced to alcohol, are in reality due to spirit-drinking.

Distilled liquors are by no means to be considered as merely dilutions of their chief ingredient. The products of recent distillation are always deeply saturated with the poisonous amylic ether, which the manufacturers call 'oil of grain' or 'fusel oil.' It is not an adulteration, for gladly would the distillers get rid of it, and would pay largely anybody able to teach them how to do so quickly and cheaply. But it is much more injurious to health than any possible adulteration. I had once an idea that this waste product might be made of economical use, as a medicine or otherwise, and gave it to a considerable number of persons in doses of from one to ten drops. The consequences were invariably feverishness and furred-tongue, and, often, headache and throbbing of the temples.

After cellaring for a year or so, a great part of this poisonous ingredient disappears by decomposition, leaving only peculiar flavours. And a quicker mode of producing the same effect is to let the spirit drip slowly through the air, at the cost, of course, of much loss by evaporation. But new, unmellowed spirit must be absolutely prohibited even from occasional or medicinal use in the dietary.

If 'fusel oil' cannot be detected by its peculiar, but not easily described, odour, it may usually be made evident by pouring some boiling water on the spirits or wine, and letting the mixture stand in a small room, or close cupboard, for the night. It is then diffused through the air. It may also be discerned in the breath of the consumer. Chemists have not helped us to any quantitative analysis of this obnoxious substance.

§ 10. Waters.

It is only exceptionally fortunate people that have a chance of choosing what water they are supplied with. Still, it is of practical use to know what are the good and bad features of

each sort; especially the bad, in order that, if they are exhibited, the source may be avoided altogether, or the dangers provided against.

Distilled water, as it is condensed from steam, is the ideal of perfect purity. It has not even air in it, and therefore tastes flat and metallic. But it makes capital tea, beer, or any other infusion or decoction.

The principal bad feature it can exhibit is derived from its very purity. From the absence of salt, it dissolves and takes up in solution any lead it may come across. So that in ships, or any other places supplied by condensing engines, frequent analysis of the water with sulphuretted hydrogen should be made, lest it should be poisoned by the pipes or cisterns.

Rain water may be, and often is, equally pure. It is, in fact, as it falls, steam condensed in the great condensing apparatus of the sky. But it is better aërated than distilled water. For culinary purposes, for washing, and the like, it is well adapted. But it is apt to pick up dirts on the surfaces where it is collected, and being, like the last, free from salts, also is readily infected by lead.

River water is principally rain-water which has been filtered by passing through the surface soil. A new risk, here, has to be guarded against, namely, that of contamination by refuse organic matter in a state of decay, but not yet sufficiently oxidised into harmlessness. The latter object is naturally secured by the motion and aëration of a flowing stream, and the greater part of the resultant dirt falls to the bottom, while the chloride of sodium and other salts make the water actually more agreeable and digestible. A purified river is the best drinking-water one can have, but unhappily it is not yet quite evident what length of exposure is necessary to secure its purification, and there is the uncomfortable feeling that any organic matter may possibly be of a highly poisonous sort. Water from this source should not be drunk unless it be quite free from taste and smell, either naturally or after filtration; or unless we can trace to an obviously harmless

source any taste or smell we find in it. By 'harmless' I mean such an impurity as peat, derived from superficial layers of that substance. This is not only harmless, but positively a security, showing that the water has passed through one of the best natural filters in the world; and a slight tinge of it is by no means unpleasant.

Water containing sewage to any appreciable extent gives off a fetid smell just before the boiling temperature, and may be easily detected in this way. The boiling temperature renders it safe from germs capable of communicating infectious disease, but it does not make it clean or wholesome.

The readiest test of the presence of unoxidised organic matter, is to put a drop of 'Condy's patent ozonised water for toilet purposes' in a tumbler of water. If the purple-lake hue thus communicated remains for a quarter of an hour, the liquid is safe; if it vanishes, there is more organic matter than there should be. The organic matter may indeed be soap-suds, or some equally innocent portion of our fated peck of dirt; but, on the other hand, it may be the germ of typhoid fever or cholera derived from a source painful to contemplate. As wise persons who have to do with strange dogs always caustic a bite, however free from hydrophobia the animal may appear to be, so it is prudent always to filter river water unless we have tested its absolute purity.

Iron is sometimes spoken of as an impurity which is a recommendation, rather than otherwise, of a water, because iron is given by us as a tonic. But I cannot agree with that opinion. We do not give iron to healthy persons; for if we did, we should often find what I have observed in some who habitually use iron-stained water, viz., deficient nutrition, dyspepsia, and obstinate anæmia. And when we give iron to the sick, we give it as a drug, and not as a drink, and only in short courses, and moreover we do not order it to be used in cookery. I should strongly advise iron springs and streams to be avoided.

Lakes are perfected rivers. The organic matter has first

been oxidised by motion and exposure, and then is deposited by rest. When Londoners see the happiness and saving due to the bringing a few feet of Loch Katrine through Glasgow, no wonder that their mouths water for Bala, or some other available lake. Meanwhile, the existing companies do their best to imitate lakes, by letting their property rest in reservoirs before distribution.

Marshes are, however, in a very different position from lakes. They are not deep enough to allow the organic and mineral matters to be dropped out of the way, and moreover they are filled with decaying weeds and insects. It is an observation due to Hippocrates, that the drinking of marsh water causes enlargement of the spleen, and many observations have decidedly confirmed this evidence of the conveyance of ague poison by drinking-water. Hippocrates remarks also on the unhealthiness of marsh water, arising out of its frequent change of temperature; it is hot in summer, and icy in winter, thus tending to produce catarrhs.[1]

Springs are underground streams. Before the surface drainage which supplies them has got down to their level, it has been most thoroughly filtered of organic matter, so they are clear and bright. Moreover, being kept at a considerable barometric pressure, they hold a good deal of carbonic acid in solution, which renders them sparkling and exhilarating. But the presence of that carbonic acid makes them take up also a good deal of lime, iron, and other mineral constituents of the deep soil. They are 'hard,' that is to say their lime forms an insoluble compound with soap, curdles it and prevents it cleaning your hands. This is a very good test of the presence of an excess of lime; and another is a deposit taking place in the teakettle after the carbonic acid, which suspends it, is driven off by heat. Hard waters dry up the mucous membranes just as they do the skin, arrest digestion, and thus cause gout, gravel, and stone to be prevalent in the districts watered by them.

[1] *Hippocrates*, vol. i. p. 532–3, edit. Kühn.

Ordinary hard waters owe their objectionable quality to carbonate of lime made soluble by the presence of carbonic acid, and derived from the chalk in the strata through which they have passed. This is in a great measure cured by the means by which it is detected, as above mentioned, viz., by boiling. But in certain districts, as for example in the Vale of Belvoir, the hard waters contain sulphate of lime, which is not thrown down by heat. So no boiling will rectify them, and in such districts rain or surface-water should be employed for drinking and cooking.

Shallow wells have the same virtues and faults as rivers. They are peculiarly liable to be poisoned by the neighbourhood of house drains. *Deep wells* have rather the characters of springs. The tests of goodness are applicable accordingly. And, here, it may be remarked that the tests mentioned above are merely hints to excite suspicion, selected as readily applicable without the apparatus of a laboratory. If a doubt arise, no analysis should be trusted but that of a special analyst, for which full instructions are given by Dr. Parkes[1] and others.

The perfections of water are to be—

1. Soft.
2. Clean.
3. With air and carbonic acid in it, to make it refreshing.
4. With salt in it, sufficient to make it tasteless,[2] and to prevent its too ready contamination by lead.

Mineral waters for dietetic, as distinguished from medicinal, use, should have the same virtues. Manufacturers say that 'soda water' is always most popular, if it contains a minimum of soda, that is to say if it is simply good drinking-water

[1] *Practical Hygiene*, b. i. chap. i. sect. 5.

[2] Tastelessness is sometimes looked upon as an evidence of the purity of water; but this is not strictly true. Distilled water, of absolute purity, has a decided metallic flavour, which is removed by the addition of salt and air. The probability is that by these additions it is more assimilated to the fluids of the body, and therefore is more digestible, more quickly absorbed. For the same reason unboiled albumen is proverbially tasteless.

aërated. And a very delicate beverage is the fashionable 'Apollinaris water,' the salts in which are in proportions to render it most soft and velvety to the palate, and not in such quantity as to give it any medicinal action. It is as good for health as the water of Loch Katrine.

Potash and *Lithia waters* should be used by invalids only.

I have heard some parents object to their grown up-sons drinking soda water, under the idea that it diminishes their chance of seeing grandchildren around their hearth. I have not been able to trace any such baleful influence.

Toast and water (made by pouring boiling water on a burnt biscuit and two or three cloves) is a wholesome drink, for it secures the neutralisation of all organic matter.

Barley water, if well boiled for about a quarter of an hour, is also a good formula for making hard water more digestible. The 'pearl barley' of which it is made, should be washed with two waters before using, and about two ounces to the quart is generally found enough to make a drink to quench thirst. Some very thinly shaved lemon rind is the wholesomest flavouring.

Those who drink for pleasure *lemonade*, *orangeade*, *ginger beer*, and the like, should always prepare them at home. The small dealers, who brew what is sold, are prone to use the cheaper tartaric, malic (as found in rhubarb), oxalic, and even mineral acids, instead of oranges and lemons. And they employ, as flavours, the amylic ethers, or 'fruit essences,' most deleterious drugs.

Cups of various kinds are wholesome drinks, if not too much fortified with spirituous liquors. Curaçoa should never be allowed to enter into their composition; the peel of a Tangerine orange ground over with a lump of sugar, will give all the flavour without the poison. Borage and cucumber rind are not injurious.

Ice.—In Dr. Bidder's experiments on the gastric juice, he found that low temperature does not exercise any deleterious influence upon it. When absolutely frozen, it dissolved albu-

men as well as ever, though it was quite spoiled by heat.[1] Again, the secretion of glands is arrested by feverishness of system, or by local elevation of animal warmth above the normal degree, and, in hot weather or hot rooms, it cannot but be beneficial to the stomach to reduce the unusual temperature to which the over-heated blood has brought it. Ice, therefore, is one of the most generally useful additions to the dietary of both sick and healthy which the energy of modern trade has made; and the ice-box puts a daily supply within reach of us all. The only time when ice is found injurious is, during the exhaustion and real cooling consequent on violent exercise and perspiration. Pond ice, glacier ice, and snow are much inferior to the lake ice with which the English market is supplied. They contain foreign and, sometimes, organic matters, and melt sooner. Ice machines are to be recommended as a means of obtaining cold, when the best ice is out of reach. They are so frequently improved, that it is unadvisable to say which is the best at present.

[1] *Die Verdauungssäfte*, Bidder and Schmidt, Experiments ix. 1, 2, x. 1, xi. 1, xvi., xvii.

CHAPTER III.

ON THE PREPARATION OF FOOD.

The most important element in cooking is, indubitably, the cook. And the most important of a cook's virtues is shown in the selection of food. A good cook is, to a certain extent, born, not made; and if born deficient in necessary faculties, the novice should be made to understand that she has mistaken her mission. The necessary faculties are those of accurate taste and smell—with which, joined to enthusiasm and punctuality, she may become a useful and honoured member of society—without which, she is simply an incumbrance. The tests to try her by are plainly cooked eggs, joints, and vegetables. If she regularly sends these up in a state to give a zest to her master's appetite, let him think no trouble or expense wasted in teaching her whatever she desires to learn; if they excite disgust, harm rather than good is done by her technical knowledge of those disguises of inferiority known as 'made dishes.' Cleanliness may be taught, a variety of receipts may be bought, but a delicate nose is beyond price. Choose a cook young, choose her carefully, and treat her liberally.

It is an old remark that a good cook shows generally a bad temper. There is more truth in it than in most proverbs; for the fact is that in half-educated persons, just indignation is apt to bear the appearance of wrath; and the needful rebukes to over-reaching tradesmen, and the disappointments which one who loves her work must feel, if her enthusiasm is not

appreciated, beget a sharpness of tongue and manner difficult to endure. Nevertheless, it is wise to bear and forbear, and to keep an efficient servant when you have got one.

This is not a cookery-book, and therefore, of course, the details of the kitchen could not be entered into, even were I equal to the task. It is not the business of these pages to teach how to make food nice, except so far as that quality indirectly bears upon its wholesomeness. All that can be attempted is, to point out a few particulars in which the preparation of food bears upon what is known of the physiology of digestion and the economics of nutrition. And in a future chapter will be discussed the extent to which a physician should interfere with the cook in the administration of food to his patients, in sickness.

No kitchen is complete without an open range. It is impossible to have a properly roasted joint by any other means, as I learned by visiting the private premises of a 'Patent Kitchener' manufacturer, and finding there an old-fashioned fire-place in full operation. He cared too much for his diet to employ his own works. Experience has led me to question even the economy of the closed fire in practical working.

Roasting is the most perfect mode possible of preparing meat for the table. The heat radiated from the open range coagulates the outer layer of albumen, and thus the exit of that which is still fluid is prevented, and it becomes solidified very slowly, if at all. The areolar tissue which unites the muscular fibres is converted by gradual heat into gelatine,[1] and is retained in the centre of the mass in a form ready for solution. At the same time the fibrine and albumen take on, according to Dr. Mulder,[2] a form more highly oxidised and, especially in the case of the former, more capable of solution in water. The fat also is melted out of the fat cells, and is

[1] Not, however, the sarcolemma, which an experiment of Professor Kölliker's seems to remove from the class of substances yielding gelatine. See Kölliker's *Mikros. Anat.*, vol. ii. p. 250.

[2] Quoted in Moleschott's *Diätetik*, p. 450.

partially combined with the alkali from the serum of the blood. Thus, the external layer of albumen becomes a sort of box, which keeps together the valuable parts till they shall have undergone the desired changes by slow heat—a box, however, permeable by the oxygen of the free surrounding air, so that most of the empyreumatic oils generated by the charring of the surface are carried off. As these are neither agreeable nor wholesome, the loss is a gain. There is also an acrid volatile product, acroleine, produced by the burning of the fat, which is better removed.

The first part of roasting should therefore be got through rapidly, by close exposure to a bright hot fire, in an open, well ventilated kitchen. By this, the gravy is retained in the meat, till, at the first incision, it flows out of a reddish colour. After the complete coagulation of the albumen on the surface, the joint should be removed a little further off from the fire, so as to roast gradually through.

The whole time of roasting depends partly on the weight of the joint, partly on the sort of meat—

Brown meats, such as beef, and mutton, and goose, require a quarter of an hour for each pound.

Veal and pork, the same, with five or six minutes added at the end to make sure of absence of red.

White-fleshed birds take somewhat less; for example, a turkey of 8½ lbs. (according to M. Gouffé) only an hour and three quarters, a capon of 4 lbs. fifty minutes, a fowl of 3 lbs. half an hour, a pheasant thirty-five minutes, a partridge fifteen minutes.

The fire should be thoroughly lighted before commencing, and kept up evenly; two gills of broth put in the pan, and the larger roasts basted with it five or six times, the smaller three times, during roasting. Before removal from the spit, some thick fleshy part should be pressed with the finger, to ascertain that it is soft. Uncooked parts retain their elasticity. All these times have been calculated on the understanding that there is no draught to lower the temperature between the fire

and screen, for, however airy and well-ventilated the kitchen should be, such an irregular distribution of heat is most noxious, and overthrows all calculations for the due roasting of meat.

M. Brillat-Savarin pronounced *on est né rôtisseur*; in this he does not show his usual wisdom, for an eye on the clock will supply the lack of an instinctive knowledge of time.

Roasting properly conducted is the most scientific and wholesome, and on that score the most economical mode of dressing meat.

Baking naked meat at a high temperature is a feeble imitation; and the way cooks have of baking first, and then browning the outside, so completely reverses the needful order of the required processes that it may be designated a fraud. Baked meat is ill-flavoured and indigestible from the saturation of the substance with empyreuma; but it is not so when the temperature is moderate, and when the materials are further defended from it by a layer of some bad conductor of heat, such as a thick pie-dish, or a crust, or a coat of clay (as practised by the gipsies). No empyreuma, or product of charring, is then formed; and the fat and gravy which ooze out, assist in the cooking. The process goes on even after the dish is taken out of the oven, if it is kept hot by being enveloped in a thick flannel, or placed in one of Silver's Norwegian cooking boxes. The 'Cornish pasty' is the most perfect dinner that a labourer, or sportsman, or artist, can have brought to his mid-day rendezvous. Meat or fish, and potatoes, or anything in short that the taste or purse dictates, are enveloped in a thick solid crust, baked slowly, and then packed in several layers of woollen. The basketful will keep warm for hours, and is the *ne plus ultra* of out-door refreshment.

Vegetables and fruit demand the same slow treatment. For a large party, apple or gooseberry pie should be baked all night in an old-fashioned red dairy pan.

Eggs should not be used, or at any rate very sparingly, in

bakes; for submitted to heat for a long period, their albumen becomes more and more tough and insoluble.

Rapid boiling has, in a minor degree, the same case-hardening effect on the meat as roasting; but the interior albumen seems, by this process, more hardened and less digestible. In boiling a joint, the heat should be kept up for five or six minutes. Then, it should be cooled down by the addition of three pints of cold water for each gallon of boiling water, and retained at that heat.[1]

In boiling fish, the addition of salt to the water, or the use of sea-water, makes the flesh firmer, and retains the flavour in the interior; but in making stock for *souchées*, the softer the water the better.

Mutton is best boiled in hard water, for the same reason as fish.

Slow boiling makes, it is true, a nourishing soup, but converts the muscular fibre into a mass of hard strings, which, eaten or not eaten, are in nine cases out of ten equally wasted. They are to be found in the fæces, exhibiting all the beautiful transverse striæ of their original state, quite unaffected by their intestinal journey.

The utility of *Soups* and *Broths* depends on several circumstances which modify the advantages accruing from their liquid state. In the first place, heat seems to have an effect in some degree proportioned to the period of application to albumen, rendering it more or less insoluble, at the same time that, to a delicate palate, there is a decided loss of flavour. Thus soups and stews which are kept too hot, are wholesome enough during the first few hours, *may* be digested at a

[1] That is to say, reduced with water at 50° from 212° Fahrenheit to 170°, or to the extent of 42°. The formula in the text is given as a specimen of the best, perhaps the only, mode of directing cooks how to reduce temperature. The female mind abhors meters of all kinds, and degrees Fahrenheit mentioned in our orders would infallibly entail their rejection, as only fit for hospital nurses. Medical men cannot be too cautious to avoid introducing anything reputed 'chemical' into the kitchen.

railway refreshment room for some hours after, but on the second or third day give the rash stranger, beguiled into a cheap French dinner, an almost certain diarrhœa. Though finely divided, the minute fragments of muscular fibre seem to be, individually, rendered insoluble by continued heat.

Then, again, a high temperature, too long continued, extracts from the meat all its gelatine—an innutritious material which envelopes the fragments of fibrin in the stomach, and prevents their being acted upon. And this is all the more likely, when an over-anxious cook tries to make the soup what she calls 'good' (that is, strong, stiff, and gluey) for invalids.

Again, if the soup is, by straining, made clear and ornamental, a great deal of the most valuable part of it is removed: the *bouilli*, if not over-boiled, contains the chief constituents wanted as nourishment.

This subject will be reverted to when discussing cookery for the sick.

Soup is rendered more wholesome and nutritious for healthy persons by the addition of vegetables. Thus, the 'Administration de l'Assistance publique' in France, adopted, by the advice of a commission of physiologists and physicians, a formula for the preparation of bouillon embracing this addition. Reduced to approximate English measures the recipe is as follows:—

Water	4 pints.
Meat (with bone)	2 lbs.
Carrots, turnips, and other vegetables	6 ozs.
Salt	$\frac{2}{3}$ oz.
Roast onions	$\frac{1}{4}$ oz.[1]

It may be safely commended for adoption in 'soup-kitchens.'

Boiling is a form of cookery peculiarly adapted to vegetables. Dr. Paris[2] remarks that it deprives them of a con-

[1] Cyr, *De l'Alimentation*, p. 49.

[2] *Cyclopædia of Practical Medicine*, i. 576.

siderable portion of contained air, which is injurious to digestion when in excess. Potatoes should be steamed or boiled in their skins, and not so long as for them to fall to pieces from the breaking of the starch granules; when skinned, they ought to retain their shape. On the other hand, the cabbage tribe and carrots can hardly be boiled too long. It is essential that soft water should be employed, and it is the securing this, that makes steaming such an advisable form of boiling, for steam is, of course, soft water.

Particular care should be taken that vegetables are thoroughly boiled soft all the way through, and dried on a cullender.

A certain quantity of oleaginous matter renders vegetables, in which there is much combined water, less massive in the stomach. Thus, roast potatoes are better for the addition of some fresh butter, and mashed potatoes for a little cream beaten up with the *purée* after it has been passed through a sieve; and, again, milky rice pudding does not collect into a lump as plain rice is apt to do. In making the latter dish up for baking, eggs should never be used. Baked white of egg is the most insoluble form of albumen possible.

Plain boiled rice should always have a little fresh cold butter mixed up with it. In that way, it will serve as an accompaniment of meat at dinner.

Stewing has the advantage over dry baking, that there is no charring or formation of empyreumatic gases; and the heat is not too great. The principal objection to it is that the meat often gets saturated with the fat gravy, and is, thus, too rich for some persons.

It is, however, not nearly so liable to this objection as *Frying*. Unless conducted with great skill, this process coats each particle of the food with a medium difficult of penetration by the gastric juice, for it is oily, whereas the secretion of the stomach is watery. Butyric acid and other rancid and empyreumatic educts are formed, and disturb digestion, producing, not rarely, flatulence and heart-burn. The art consists

in frying 'lightly,' as cooks phrase it, that is to say, quickly and evenly, and with constant motion, so that the high heat required does not char any part. For those who do not dislike the flavour of oil, it is a more manageable medium than butter, and generally turns out a lighter dish. Good Lucca or Provence oil is also less likely to be sophisticated than bought butter.

Hashing is not to be encouraged. From the two processes that are gone through, the animal fibre is too much hardened to be readily digested. Cold meat is wholesomer, and may be made as palatable with mayonnaise or some such sauce. If it must be done, at least let a water-bath (*bain marie*) be used.

Marinating, that is, baking in vinegar and water with layers of bay-leaves and pepper-corns, is suitable for the more oily kinds of fish.[1]

Broiling imparts a peculiar tenderness to the meat, by the rapid hardening or browning of the surface preventing the evaporation of the juice. It is, in fact, roasting applied to small portions of meat. Tradition commends it as a suitable cookery for the meat of persons in training; but, perhaps, in no sort of dish does it shine so much as in fish.

In the preparation of *mixed dishes* and in *seasoning* it should be a general and almost universal rule that the different ingredients should be as far as possible cooked separately. The reason is obvious—each article, from its texture, requires, for its perfection, to be submitted to heat for a different period. Too long exposure destroys its flavour and solubility. To take familiar examples—an egg if made into a custard, or just coagulated, is tasty and wholesome; but if baked for half an hour in a pudding it becomes useless as an article of food. Spices lose nearly all their flavour, while retaining all their irritating qualities, if mixed in a dish before boiling; yet if

[1] Another mode of wholesomely cooking oily fish such as sprats, pilchards, or herrings, is to stew or bake them in a deep dish in layers, with a layer of breadcrumbs between each.

heated up separately and for a shorter time, they retain it, and will suffice in much smaller quantity. Soup, on the other hand, requires less boiling than the vegetables which are usually put in it. If boiled together, the latter are therefore sure to be underdone. If baked in a tartlet, jam loses all fruity odour and taste, and sinks into the paste. It should be only barely heated after the paste is done. Just warm an oyster, it is sapid and digestible; bake it in a beef-steak pie, it is leathery and insoluble. It ought to be put in cold, just before the dish comes to table. Onions require long cooking; but the other seasoning herbs usually used in broths should not be sprinkled in till a late stage of the boiling.

The effects of *salting* are often misunderstood. It is well known that living exclusively on salted meat produces scurvy; and it is imagined that the injury to the system arises from the saline matter thus introduced into it. Such, however, is not the case. Chloride of sodium is such a large constituent of our blood that it cannot possibly be noxious. The unwholesomeness of salt meat, as an article of diet, depends on its deficiencies, not on its excesses: it has lost, according to Baron Liebig's calculation, half its nutritive value by the removal of its fluids and salts by the brine; and the dried-up remnant is difficult of solution. Soaking in water may soften and remove the salt, but it does not restore its nutritive value.

Smoking and *Drying* are not quite so injurious to the texture of the flesh as salting. It would seem that in the latter the hardening process goes on continuously; in fact, the salt remains and continuously extracts the aqueous constituents. But the drying takes place once for all, and the article gets no worse when it is once prepared, until decomposition occurs. These modes of preparation seem peculiarly adapted for fish, which naturally perish so readily, and which are more injured than even meat by salting.

Tinned meat cannot make any claim to a recommendation except on economical grounds. When heated up for the table, it is too much cooked to be digestible or pleasant. It is best

eaten cold, with some of its own jelly, and salad or mayonnaise sauce.

The process of 'tinning' meat is well known to consist in the expulsion of air from the material by means of heat; and it is to be feared that so long as this procedure alone is employed, the injury from the excess of temperature is unavoidable. The aim of the inventor should be, to effect the same object by the aid of air-pumps in the cold.

Ice seems to promise more favourable results than the last-named device, for preserving meat during its conveyance over long distances—from the overstocked producer to the hungry consumer. The attempt has hitherto failed from several avoidable causes; but the Committee of the Society of Arts, who have taken up the matter, are sanguine of final success in putting the Australian fresh meat butcher in direct communication with the English labourer. It should be remembered that meat which has been thus preserved requires immediate cooking, as it quickly goes bad from the change into a higher temperature of air. It should, if possible, be brought home in an ice-box, and kept there till wanted.

Vegetables preserved by drying undergo an interstitial hardening of the tissues which renders them insoluble in the saliva, as may be observed by their want of flavour. They are inferior to fresh vegetables for use in preventing scurvy—indeed they seem inferior to lime juice for that purpose—so that they cannot be wholesome for the healthy. It is a fact, not explained as yet, that long transport, especially by sea, however rapid, has a somewhat similar deleterious effect on vegetables; so that we do not get the advantage which might have been anticipated from the increased rapidity of communication with distant supplies. A notable instance is that of Algerian peas.

The preservation of food by excluding the air by means of oil is a subject which requires further experimenting upon. Delicate fish, such as sardines for example, can be kept in this way for a long time; and from time immemorial the

method has been adopted for wine in Italy. A thin layer of fresh oil in the neck of the flask obviates the necessity of a cork in wine not intended to travel, and is much more efficient, preventing even the lightest and most perishable liquors from turning sour. Potted meats and sausages are often judiciously preserved by a layer of lard, which seems effectual in retaining moisture and preventing decomposition. Why do we not apply the same principle to the storing of jams, gooseberries, plums, &c., for winter use?

Preservation with sugar has the disadvantage of introducing an ingredient which is cloying to the appetite, a mask to the natural flavour of the vegetable, and, moreover, apt to generate an excess of acid in the stomach.

As a rule, forced vegetables, and fruit out of season, are not to be recommended. The natural period of its perfection is long enough for us to enjoy each; and, then, a change is as wholesome as it is pleasant. To bring them to table sooner gratifies merely a vulgar ostentation or impatient gluttony, and receives its just punishment in a premature weariness.

Certain articles of diet yield their savours best when their valuable ingredients are got out in the form of an *Extract*. An illustration of this may be found in the *Guatemala mode of preparing Coffee and Chocolate*,[1] which is as follows:—

'Coffee berries are used that have been stored dry one year. Taking enough for one or two days' consumption, they rub them in a linen cloth, and lay them in the sun before roasting. This operation is always performed by the lady of the house, over a quick charcoal fire, in an iron cylinder, which she keeps turning for ten or fifteen minutes, till the berries are roasted on all sides. The most esteemed bean is the "pea-berry" (which bears the round monocotyledonous form, instead of the dicotyledonous), in consequence of its browning more evenly. It is not a different species of coffee, but an accidental variety, more common on some trees than others.

[1] Dictated by Mrs. Osbert Salvin.

At the critical moment of perfection, the berries are emptied into a basket and stirred round to prevent their further concoction. They are then ground, and a very strong liquid extract is made from them by infusion in hot water. A common percolating coffee-pot will serve this purpose, and save straining. A dessert-spoonful of this essence, with either boiling water or boiling milk poured on it, forms a cup which is the invariable *bonne bouche* of every meal.

'Cacao trees grow wild, and are also cultivated round some Indian villages; the berries are dried in the sun; and an Indian woman generally comes to your hacienda to make them into chocolate. Kneeling before her mill, consisting of a smooth curved surface with a heavy stone roller, she grinds the kernels up with an equal weight of sugar, and flavours with cinnamon or vanilla, the latter a wild product of the forest. It is ground three times over, and, when in a smooth paste, is cut into oblong square pieces, each enough for one cup. It is then dried on a plate over a charcoal fire. When required for use, it is dissolved in boiling water or milk, and a thick froth worked on the top of each cup with a swizle stick or whisk. The cup is often filled up with milk-cheese, cut into small dies.'

A principle of rational cookery, much overlooked by professors of the culinary art, is that each article of diet should be so prepared that its own natural flavours and other characteristics should be enhanced, instead of being masked or destroyed. Condiments and sauces should be so moderately used, as never to be a prominent feature; and, then, should be so blended and balanced, as to make it difficult to identify them. There seems to me nothing utopian in the idea of a universal sauce, adapted to all sorts of animal food, making them all more savoury and more wholesome at the same time.[1]

[1] This is an old ambition, see Pepys's Diary, Feb. 10, 1661-9. The Duke of York 'did mightily magnify his sauce, which he did then eat with everything, and said it was the best universal sauce in the world, it being taught him by the Spanish Ambassador; made of some parsley and

There is ample scope for individual taste in the selection of the variety suited to the user's palate.

One is almost ashamed to mention cleanliness as an essential in cookery, the idea of the contrary condition in eatables is so repulsive; but cooks do not seem aware how often their dishes are unpalatable, and, therefore, unwholesome, solely from being prepared in a vessel which has a disagreeable flavour remaining in it. Soap is sometimes employed in washing pots, instead of soda; and the taste of the rank train-oil seems to adhere to the metal, and to infect a succession of otherwise excellent material; and so adheres the odour of onions, and of several other condiments, to a steel knife. The use of printed paper to stand glass and crockery upon, in cupboards, is also objectionable, as the oily effluvium from fresh printing-ink is very rank, and acrid, and penetrating, as our patients who suffer from hæmorrhoids well know to their cost.

Fish is an article very often spoilt by injudicious endeavours to make it palatable. 'Melted butter,' in reality, requires the hand of a first-rate artist, whereas every kitchen maid thinks she can concoct it. Unless M. Gouffé's instructions have been followed to the letter, it is best avoided altogether. A few drops of Chili vinegar, or black pepper vinegar, or elder vinegar, or Worcester sauce, or a slice of lemon, or a sauce made by boiling pepper and salt in plain water with a few favourite herbs, assist the digestion of the fish, whereas greasy sauces impede the process, chemically and mechanically.

Grilling does for fish that which roasting or boiling does for meat, and is a commendable mode of preparation, especially as it obviates the temptation to take sauce.

Those professional lectures are usually the most instructive which take up some universally known and simple matter

a dry toast, beat in a mortar together with vinegar, salt, and a little pepper; he eats it with flesh, or fowl, or fish. . . . By and by did taste it, and liked it mightily.'

relating to a subject, and use it in illustration of the principles involved in the art to be taught. To exemplify the elements of sanatory cookery, perhaps nothing could be more fitly chosen by a lecturer than the cooking of an egg. First, for the name—our great-grandmothers (if proverbs register language truly) talked of 'roasting' an egg; we call the same process 'boiling,' marking the fact that there is no essential difference between the two, the end of both being the same, namely, the bringing albumen into a mechanical condition more suitable for the digestive viscera than when raw. Then, an egg, more clearly than any other meat, exhibits the *virtues of freshness*, and the vices of defects in that quality. Boil an egg warm from the nest, and you recognise it by its creamy, lightly coagulated, eminently digestible form of albumen. Even by next day it is less perfect, and steadily degenerates in value, till it becomes the most hateful of poisons. Here, may be pointed out, the *importance of selection* according to external obvious qualities.

Next, should come a scientific picture of the *coagulation of albumen* by heat. Albumen begins to coagulate at 140° [1] very slowly, but does not form a solid mass with rapidity under the temperature of nearly 212°. Till it has formed a solid mass it is easily permeable by heat, and the central parts are solidified, therefore, equally with the exterior; whereas, coagulated albumen is a bad conductor of high temperature; and if the outside sets quickly and firmly, the inside remains light and semi-solid. Boil an egg at a slow heat, and it is not cooked till hard all through; put it into quite boiling water, and the white sets soon, and leaves the albumen of the yolk soft. This illustrates the rules given a few pages back, about applying *at first a high heat* in roasting and boiling, and afterwards moderating it, when the hardened surface has enclosed the deeper parts as in a box. The *shell of the egg* may be a text to demonstrate, how in baking and frying the external media,

[1] Simon's *Chemistry* (Day's translation), vol. i. p. 16.

the crust and the oil, retain the whole of the substance, so that there is no loss during these economical culinary operations, though the meat is less wholesome.

Then, that this loss of wholesomeness is due to the saturation of the article of diet with the products of dry distillation, and, also, that enhancement of natural savour, solubility, and wholesomeness run in parallel lines, may be illustrated from the observations of Beaumont on the different times occupied in the gastric digestion of eggs in several conditions. He found, for example,

	Hours	Minutes
Eggs, whipped and diluted, occupied in digestion .	1	30
„ fresh raw „ „ .	2	0
„ fresh roasted „ „ .	2	15
„ soft boiled (or poached) „ „ .	3	0
„ hard boiled „ „ .	3	30
„ fried „ „ .	3	30

It may be observed that this is just the order in which they are tasty; that is to say, the degree in which they come with facility into contact with the sensory nerves distributed through the mucous membrane; so that pleasure and duty here, as usually in natural operations, become one.

General rules for the *preservation of food* are somewhat deceptive. They lead to their being too much practised for the display of the pride of ingenuity. The fact is that food is always the worse for storing in respect of its wholesomeness, even if its taste is not injuriously affected.

But economical reasons exist for the restricted exercise of this art. The principle consists in excluding the evil oxidising influences of air and moisture. In dry goods this is done by keeping them dry and warm and closely covered up. Starch, rice, tapioca, sago, macaroni, vermicelli, sugar, sweetmeats, jams, salt, and dried and salted meats, tea, coffee, &c., require this treatment. And they should be kept in a different cupboard from odorous goods, such as candles and soap, or they will catch the objectionable flavour. But with most fresh organic substances a different treatment is necessary to the

attainment of the same end. They contain in their texture itself sufficient moisture and air to oxidise them into decomposition, and the more stagnant these are the more surely do the chemical actions result. It is necessary, therefore, to let them have free ventilation; their external surface should be frequently wiped, or at least blown over by a current of air, so as to let the old moisture escape and fresh be absorbed. Thus, meat should hang exposed in an open larder, and be often dried. Lemons should be purchased in the summer and suspended in nets for use at the time when they are dear. Onions and garlic should be strung up in an outhouse (not the larder). Parsley, thyme, mint, and other herbs should be dried in the wind, out of the sun, put each into a separate paper bag, and hung up in the kitchen. Where apples and pears and chestnuts are stored, the window should be left open, and the fruit frequently turned. Too much draught makes vegetables withy; so they should be laid on a stone floor behind the door. Potatoes are best stacked in dry sand.

The date when each article is stored should be written down.

Eggs are an exception to the usual rule respecting organic substances. They cannot be treated in the same way by reason of their structure, yet it is impossible to avoid keeping them for culinary purposes. They are best preserved by being washed over with a solution of gum and packed in a square box of bran, which is to be turned over a quarter of a turn every day.

CHAPTER IV.

ON DIGESTION.

THE most recent systematic teacher of physiology defines digestion as 'the process by which food is reduced to a form in which it can be absorbed by the intestines and taken up by the blood-vessels.'[1] The process consists in the aliments being passed along a canal, thence called the 'alimentary canal,' running through the body, where it comes in contact with fluids oozing out from various glands, which mixing with it dissolve it, and reduce it to a homogeneous juice or 'chyme.'

The more perfectly and quickly this end is attained, the more healthy is the digestion.

These fluids resemble one another in being watery, saline, and albuminous, like the serum of the blood, so that they are well adapted for passing readily through the mucous membranes by endosmose. They pass in, as they passed out, freely, and carry in with them the nutriment prepared in the alimentary canal. But there the resemblance ceases; and the differences of the fluids poured from the different glands are very marked, and their actions on the various constituents of the diet are strikingly specialised.

1. *The saliva*, secreted from the glands of the mouth, is

[1] Dalton's *Human Physiology*, fifth edit. chap. vi., where will be found a complete *résumé* of the scattered contributions of others up to the present time, often illustrated and criticised by the light of the author's original investigations on this subject. An old *résumé* of mine, entitled *Digestion and its Derangements* (London, 1856), is out of date, as well as out of print.

alkaline, glairy, and adhesive, and possesses the power of converting very rapidly the unabsorbable starch into soluble and absorbable sugar.

2. *The gastric juice*, secreted in the thin layer of gland which lines the cavity of the stomach, is acid, and can dissolve, so long as it is acid, the solid albumen and fibrin of flesh food.

3. *The pancreatic juice* is again alkaline,[1] very full of albuminous organic matter, and capable of exerting a peculiar influence on fatty matters. It disintegrates them, and reduces them to a state of emulsion, so that the mixture of fat in the watery fluid it floats in, is white and opaque. In this creamy state, it is capable of soaking through the mucous membrane and passing into the blood, by the same way as the starch and fibrin.

4. *The bile* is very different from any of the above fluids in chemical reaction and contents, and it does not appear to possess the power of dissolving starch by turning it into sugar, or of dissolving fibrin, or of emulsioning fat in any degree equal to pancreatic juice, though it is itself of a soapy nature, as is shown by the commercial use of ox-bile by carpet cleaners to remove grease-spots. It is neither acid nor alkaline, but it possesses considerable bleaching powers, and, also, arrests decomposition in animal substances. In this latter capacity, it is highly conducive to our comfort by obviating that intolerable odour which distinguishes the excretions of patients in whom the bile is deficient. But, with all this, it does not clearly appear how any of its known physical properties can aid in the constructive assimilation of nutriment. Yet aid it does, most decidedly. If, in consequence of accident or disease, the flow of bile into the alimentary canal is wholly cut off, the animal rapidly emaciates, and dies starved. Even when the supply of bile is only partially diminished, as in the instance of some of our patients, there is a marked deficiency of nutrition, shown in loss of weight and anæmia. Now, this

[1] Dr. Dobell questions its alkalinity. Perhaps it varies with the state of the body.

would not happen if bile were a mere excrementitious fluid containing ingredients resulting from the disintegration of the tissues, and designed merely for their removal from the body. It has assimilative functions to perform beyond the simple drainage of the blood, though what those functions are can be expressed only in the vaguest terms at present, and the most prudent and most recent physiologists decline to give a definite opinion on the uses of the bile.

5. *The intestinal juice* is secreted alkaline, and possesses the power, like the saliva, of converting starch into sugar; but, unlike that fluid, does not lose its power in presence of an acid. It, also, has a certain solvent power over albumen, inferior, indeed, to that of the stomach, but stronger in this respect, that it is not checked by the bile or pancreatic juice.

Thus, we see that a meal, as it passes downwards, is irrigated first by a watery fluid which, as it dilates and adds to its bulk, dissolves or fits for absorption a great portion of its starchy constituents. Then, it is further irrigated by a still more dilute fluid, which dissolves its meaty part. Then, the fat is washed out of it by the stream of pancreatic juice. And, simultaneously, the bile is poured on it in a continuous stream, which makes it, in some unexplained way, more easy to be taken up as nutriment. Afterwards, the intestinal juice, oozing out in small quantities throughout a long canal, seems fitted to make up the deficiencies of any of the previous solvent acts.

The daily quantities of these fluids, as estimated, mainly, from the results of Drs. Bidder and Schmidt's experiments, may be reckoned, at least, to equal the following:—

Of saliva	$3\frac{3}{4}$ pints
Of gastric juice	12 pints
Of bile	$3\frac{3}{4}$ pints
Of pancreatic juice	$1\frac{1}{2}$ pints
Of intestinal juice	$\frac{1}{2}$ pint

making in all nearly three gallons. Of this, ninety-six per cent. is water, of which only so much passes away in the

stools as prevents them from being inconveniently solid. The rest, therefore, that is to say two gallons and a half, is restored to the blood by absorption.

'The clearest notion we can gain of the business performed by all this two dozen pints of water which exude on the mucous membrane of the intestinal canal, and are by the same membrane taken up again, is by viewing them as a *circulation*. It is constantly going its rounds like an endless chain, finding and taking up inside the solid structure of the body substances which ought to come out and be got rid of, finding outside nutriment which the body wants, and conveying it in.

'Truly, when a man contemplates with the eye of the reason this unceasing journey, this great current so entirely removed from the cognisance of our senses, he is at first confounded with the novelty of the ideas it excites (*ingenti motu stupefactus aquarum*) and almost refuses to receive them. It is highly important, therefore, to bring it frequently before the mind till it becomes habitual, for there is no view of living phenomena so practically weighty for the medical man.'[1]

In addition to this, there is a quantity of fluid introduced as beverage. Water passes straight through the mucous membranes unchanged, and alcohol, with a change of no weighty importance; and dissolved in them are numerous minor substances not strictly dietetic, though valuable by acting pleasurably or medicinally on the nervous system.

Rightly, then, has digestion been likened by an old chemist to a process of 'rinsing;'[2] all that is required is washed out of the alimentary substances, and the remains passed on to be got rid of along with the waste products of chemical life.

Of the reason why these various secretions are able to digest the various constituents of our food, we know absolutely

[1] *Digestion and its Derangements*, p. 31.

[2] Letheby *On Food*, p. 48.

nothing. We find an albuminous matter in saliva, and we call it '*ptyalin*;' we find an albuminous matter in gastric juice, and we call it '*pepsin*;' we find an albuminous matter in the pancreatic juice, and we call it '*pancreatin*;' but the only distinguishing point about each is that it acts upon starch, or acts upon flesh-meat, or acts upon fat, just as the fluid from whence it was concentrated acts. Ultimate chemical analysis merely shows their resemblances, and not their differences. The nearest approach to a similar proceeding in nature, is the operation of malting, where, aided by heat and moisture, starch is turned into sugar by the presence of '*diastase*;' and it is remarkable enough that when albumen is artificially dissolved by gastric juice in the laboratory, a peculiar odour somewhat like that of malting is given off. But here our information ceases; there are no more points in diastase, to distinguish it chemically from ordinary albumen, than there are in pepsin or pancreatin.

In bringing to bear upon dietetics the observations of physiologists, the main things the physician has to consider are the mechanical condition in which the food should be brought, the influence of its several solvents, and the times when they are ready to receive it.

Chewing is the first provision made for securing a due mechanical condition. The perfection consists in so breaking up the mouthful that it should be as completely as possible permeated by the saliva. The object of this is, in the case of meat, to soften it in preparation for swallowing and for future solution in the stomach; in the case of starchy matter, to convert it into 'glucose' or sugar.

With regard to the amount of chewing required by flesh food, there is a good deal of popular misconception. Persons with bad, false, or tender teeth are often found to fancy that a vegetable diet is more suited to their imperfect power of mastication than an animal one; and we not unfrequently see mothers instructing their children carefully to chew meat, and neglecting the same precaution in respect of vegetables.

Physiology teaches an opposite caution. It is desirable, indeed, that the jaws should break up muscular fibre, lest it should perchance stick in the gullet, and be certainly difficult of penetration by the gastric juice in the stomach; but to a vegetable aliment the performance is owing of more important functions. It is still more indispensable that it should be broken up, for it has to be immediately acted upon; and it is indispensable also that it should be detained in the mouth till enough saliva to convert its starch into glucose has been secreted. Complete mastication, therefore, important for both, is still more important for vegetable than for animal food; and the leisurely performance of the operation cannot be prudently omitted by a mixed eater.

It may serve to remind us of this, to reflect that while lions and tigers and wild dogs bolt their food, cows not only spend the greater part of the day over their nibbled meals, but give it a second chewing when in repose.

Doubts have been thrown (Dalton's Human Physiology, page 116) upon the importance of the action in the mouth to the conversion of starch into sugar; but the following easy experiment seems sufficiently convincing. Take some boiled starch, say in the shape of arrowroot, and heat it with potassio-tartrate of copper. There is no change in the blue colour of the salt. Now, put some in the mouth, and hold it a few moments only. When it is again heated with potassio-tartrate of copper, the metal is precipitated, and shows by its brilliant yellow colour an abundant quantity of sugar.

The saliva, then, begins to convert starch into sugar immediately; and it is not slow to extend its operation to the whole mass submitted to it. A protraction of the foregoing experiment will show this. A mouthful of boiled arrowroot held in a healthy mouth for five minutes, will show afterwards scarce a trace of starch remaining.

But it is true that the morsel is hardly ever allowed to remain in the mouth long enough for its complete conversion; hardly ever is it sufficiently boiled and chewed for the saliva

to affect the whole of it. Much free starch and free saliva must be carried down the œsophagus. During its passage the action goes on, and, doubtless, as much saccharine transformation takes place in the latter as in the former locality. But in a minute or two it must arrive at the stomach, and there the acidity of the viscus is said to put a stop to the saccharisation. On this arrest of the salivary action by the presence of acid, Dr. Dalton's opinion of its slight influence in digestive solution is grounded. Nevertheless, once that the mass has passed through the pylorus, its acidity is neutralised, the action of the remaining saliva recommences on the starch yet unconverted, and this action is reinforced by the intestinal juice.

By the unconverted starch, I mean not only that which was unchanged on arriving at the stomach, but also a good deal set free since that stage of digestion. For, besides the saliva, there practically comes into play in the solution of starch that which I have described as temporarily arresting it, to wit, the gastric juice. Cookery, even when most efficient, rarely ruptures the whole of the granules. Many escape in the best, and in bad cookery the majority escape. They cannot, therefore, be affected by the saliva, till their albuminous envelope has been dissolved by the gastric juice. Then, the amylaceous matter may be converted into sugar, either, rapidly, by the saliva present, or, more slowly, by the pancreatic and other intestinal secretions.

For the reduction of starch, therefore, so as to bring vegetable food into a condition capable of easy digestion, the first point is that the salivary glands should secrete a sufficiency of fluid; and this not merely at the time of mastication, but that they should go on supplying it as long as any starch remains unconverted. Then, it appears extremely probable that the gastric glands aid the future carrying on of the process, though the acidity of the stomach prevent its continuance at the time of its prevalence.

Now, the salivary glands in the healthiest persons are

liable to derangement from purely external circumstances acting on the nervous system. Temporary emotion affects them temporarily, and chronic emotion affects them chronically. We all are familiar with the dry lips of the coward, the lover, the pitiful, and how the tongue cleaves to the roof of the mouth when pain is endured, or when bad news is brought. 'Bread eaten in sorrow' can hardly be swallowed, so long it takes to moisten the morsel. Again, bodily exertion parches the throat. It cannot be expected that meals of mixed food, swallowed when the body is under the influence of the circumstances quoted in illustration, should be dissolved, or nourish the tissues as they ought. And there is nothing surprising in the fermentation of the undigested vegetables, and the formation of flatulence by the carbonic acid which results.

Under the same circumstances, a portion of the solid meat remains undissolved, and is often thrown away unaltered by vomiting or diarrhœa; for the stomach is influenced contemporaneously with the mouth, as is clearly shown by the proverbial loss of appetite from mental causes.

It is in this arrest of secretion, that the sedative action of alcohol comes in useful. It is an anæsthetic, and prevents the effect of the nervous system upon the alimentary canal from being so deleterious as it has been shown naturally to be. A few teaspoonfuls of good strong wine or dilute spirit will often restore the lost power of taking food, and is an instinctive indulgence, as a protective against the sundry blows inflicted on digestion by the exciting nature of social life in the present regimen of the world. It is possible to imagine a state of society, as among the Pitcairn islanders, for example, where everybody was apparently the better for taking no alcohol in any form, but even in that instance, the abstinence does not seem to have lengthened life, and it is certain that in Europe, it would shorten it for many of our most active and useful citizens.

Equally important is the absorption of the sugar thus formed from the starch. In health, a very great part is

absorbed in the mouth and gullet, sometimes all, for chemists have great difficulty in finding it in the stomach, unless it is swallowed in excess. Some of it is probably converted into the lactic acid, which aids the solution of flesh food, and the rest taken up as sugar by the intestines. Still, even in health, a good deal of both starch and sugar escape, and appear in the fæces. But, in the catarrhal state, the mucus which lines the membrane is an almost impermeable impediment to osmosis, from its insolubility in water, and arrests absorption in proportion to its quantity. All mucus is a degree of disease, and every Briton knows how easily it is formed by very slight external influences.

It is clear, then, that for the easy digestion of starch the whole of the alimentary canal must be in a normal condition, and the nervous system not exhausted by recent excessive use.

The Mechanics of Digestion refer to the provision which is made for the food being duly brought into the sphere of action of the solvents described above. First comes *Chewing*, the importance of which, as a means of saturating the mass with saliva, has been already insisted upon. Here may be mentioned, further, the importance of its completeness, for the sake of reducing muscular fibre to a fine pulp, so that it may be quickly infiltrated by the gastric juice on its arrival in the stomach.

'In the human subject, the teeth combine the characters of the carnivora and the herbivora. The incisors, four in number in each jaw, have, as in other instances, a cutting edge running from side to side. The canines, which are situated immediately behind the former, are much less prominent and pointed than in the carnivora, and differ less in form from the incisors on the one hand, and the first molars on the other. The molars again are thick and strong, and have comparatively flat surfaces, like those of the herbivora; but, instead of presenting curvilinear ridges, are covered with more or less conical eminences, like those of the carnivora. In the

human subject, therefore, the teeth are evidently adapted for a mixed diet, consisting of both animal and vegetable food. Mastication is here as perfect as it is in the herbivora, though less prolonged and laborious; for the vegetable substances used by man, as already remarked, are previously separated, to a great extent, from their impurities, and softened by cooking, so that they do not require for their mastication so extensive and powerful a triturating apparatus. Finally, animal substances are more completely masticated in the human subject than they are in the carnivora, and their digestion is accordingly completed with greater rapidity.'[1]

However much natural selection may have rendered stronger the surviving species of other animals, it has, in the case of the human teeth, proved injurious to the perfection of our race. Artists have, unhappily, taught us to see loveliness in button mouths, bud-like lips, round dimpled chins, tiny pearly teeth, and to recognise aristocracy in hatchet faces. You take up a skull in one of the bone houses near old fields of battle (say at Hythe, where Pict and Briton, and others besides, grin so grimly at us), and you cannot enough admire the evenness, the firmness, the completeness of the set of half-worn, yet quite sound teeth; but you are fain to confess that to have a wife, or a son, or a daughter with a prominent square jowl like that, would be a severe trial to your æsthetic feelings. You are incurably perverted by the mediæval association of moral purity and intellectual refinement with pitifully weak jawbones; and a big-mouthed broad-nosed Helen would never have been the mother of your children—yet would she have saved you many a dentist's fee. Narrow jaws can hold but few teeth; if the natural numbers come, some must be extracted, or else they crowd together, and decay from pressure; and there is no feature which is so markedly hereditary as narrow jaws; as the mother is, so is the offspring.

When, by the grinding machinery above described, the

[1] Dalton's *Physiology*, chap. vi. p. 109.

food has been reduced to a pulp, it is easily embraced by the tubular muscles of the pharynx and œsophagus, and passed by their steady, wavelike motion downwards to the stomach; the passage is opened before it, and its return is prevented by the closing of the tube behind as it goes onwards. The sensibility of the œsophagus is so very slight, that we do not, in ordinary circumstances, feel the morsel going down; but if it is peculiar in shape and nature, we become aware how slowly and steadily it proceeds, and ought to proceed. For during this passage, much of the sugar and soluble salts, and the watery part, is taken up by absorption, and if it is hurried by bolting mouthful after mouthful in rapid succession, scant justice is done to the victuals, and a risk of indigestion is incurred. The healthy circulation of saliva in this round is very great; we have seen lately how many pints are poured out daily in the mouth, and of this but little finds its way to the intestines, the rest being taken up in the œsophagus and stomach, principally in the former. So, the importance of not interfering with its due action can be easily understood.

Once in the stomach, the mass of food acquires a rotation from the wavelike movement kept up by the peristaltic muscles of the stomach. Their alternate contractions and relaxations press on the mass, much as the undulations of a serpent carry it over the ground—only in the latter case the undulating body is free, in the former it is fixed. The surface, being the part subjected to the moving power, moves quicker than the centre, and thus the whole contents of the stomach are rotated as a uniform mass, from left to right, and continually irrigated by the gastric juice along the depending, lower, and larger part of the sac. As it passes the opening of the pylorus at the other end, the narrowing of the sac squeezes out, with a somewhat quicker motion, such portion as is dissolved into creamy chyme, and it oozes on into the duodenum, leaving the still undissolved substances to flow along the shorter and upper curve of the stomach back to the starting-point. Thus, a slow, rotatory movement of the

whole mass is sustained till all is dissolved, or, at least, so far reduced in size as to get through the pylorus.

The rotation seems to be continued in the intestines, if one may judge fairly of the action of their peristaltic fibres by the movements seen, immediately after death, in the intestines of a vigorous animal slaughtered for food. And the biliary ducts appear, also, to have a peristaltic action, rolling out gradually and regulating the flow of bile into the duodenum. Now, over all these involuntary and unfelt but constant wave-like movements, the nervous system presides; and they are, without doubt, seriously affected by all that affects the nervous system, notably by mental emotion and bodily exhaustion. The œsophagus is sometimes so paralysed by a sudden shock during a meal, that it does not close behind the victuals swallowed, and they are thrown up by a sort of regurgitation. Even some hours after a meal, the arrest of the stomach's action by emotion may cause vomiting. And many instances are on record of a mental emotion so arresting the biliary ducts as to produce jaundice. The late Dr. Macleod, of St. George's Hospital, used to relate a scene which he saw in his own practice: a young lady with distended abdomen was charged with being privately married, and her eyes and skin had got bright yellow before he left the room. And, in the wild times, when people really did get into a passion sometimes, they are stated by bystanders to have often become jaundiced. Few of us have ever seen an adult in a rage of the old sort, so that we must not question the accuracy of the statement.

Whether absorption of the dissolved alimentary substances is affected by similar causes is not clear. I see no reason to suppose that it is, as endosmosis is such a purely physical act, that the nervous system can control it only very indirectly. But, as the supply is cut off, it cannot, of course, be active during the prevalence of such interferences.

The subject of the impediments to digestion arising out of disease of various kinds, is of too great weight to be cited

merely as an illustration, and will be considered more fitly in a future part of the volume. Here is the place for a few reflections on the suitability of different articles of food.

Aliments may be called digestible when they yield readily all their nutritious particles to the fluids destined for their reduction to chyme. It is clear from what has gone before, that a comparative estimate of their digestibility cannot be made merely by reckoning, as Dr. Beaumont did, the duration of their sojourn in the stomach. That well-known physician is familiar to all, from having made a series of observations on a Canadian voyageur who had a permanent opening into his stomach, a healed gunshot wound. This was easily looked into, and the time consumed before the victuals passed out noted. But the results, which are often taken as an infallible guide by the dietician, are not truly in accordance with what general experience teaches us on this matter. For example, salt tripe or pig's trotters, by this theory, take only one third of the time demanded by roast beef, the former dish being dissolved in the stomach in one hour, and the latter requiring three, while veal took four hours and a half. Sour-crout seemed to be twice as digestible as soup made of beef and vegetables. Mutton was three quarters of an hour longer in digesting than beef, and so on. Green vegetables, again, are hardly at all touched by the gastric juice—are we therefore to conclude that they are useless ?—surely, the general observation that they are very digestible by a healthy man is more in accordance with fact.

I do not lay much stress on the objection to these experiments arising out of individual peculiarity of constitution; for in fact the subject of observation was a remarkably robust man, little affected by external circumstances, and able to carry on, in spite of the hole in his side, the laborious duty of conducting timber-rafts down the American rapids.

In order to give observations like Dr. Beaumont's their full value, they should be corrected by a set of similar tests conducted upon the duodenum and ilia, for which a good

opportunity has not yet occurred. Experiments on animals have been made, it is true; and they establish the fact that the intestinal juice is of great importance, and that the pancreas, if not the liver, aids in the solution of food;[1] but the alimentary canal, and the habitual diet, of the lower creatures are so different from ours, that a comparison of the behaviour of different articles of food in their case, affords no practical experience for human dietetics.

Something in the way of a comparative estimate might be made by laboratory experiments on the juices removed from the body, separately and mixed. Pending advances in this direction, the following general conclusions are, perhaps, all the rules our knowledge enables us to lay down:—

The degree of Cohesion has an important influence upon digestibility.—Tough articles, incapable of being ground up by the teeth, remain unused by the alimentary organs, while fluids and semi-fluids lead the van of digestibles. The tissues of young vegetables and young animals are, for this reason, more digestible than those of old specimens of the same class. And emasculated beasts, having softer muscles, are better suited for the table than perfect males. It is desirable also that the *post-mortem* rigidity, which lasts several days in some animals, should have merged in softness before the meat is cooked. But this object, usually attained by hanging in the larder, may be arrived at equally well by *immediate* cooking, before the rigidity has set in. In warm climates and exceptionally warm weather, the latter course is the preferable of the two.

That culinary preparation is the most efficacious, which most breaks up the natural cohesion of the viands. And it may be observed that the force of cohesion acts in all directions; and it is of no use for a viand to be laterally friable, if it remains in longitudinal strings.

Fat interposed between the component parts of food diminishes

[1] See the plates illustrative of Dr. Dalton's experiments, *Human Phys.*, p. 146.

its digestibility.—It is the intestinal layer of fat between the bundles of fibres of beef that makes it less digestible than mutton, and that causes larded meats often to disagree.

Dilution favours digestibility.—Yet it may be carried too far. Even water will sometimes run through the alimentary canal, carrying on too rapidly the matters dissolved in it. And inert substances, such as woody fibre, if mixed up in too great quantity with food, dilute it so much that the central parts of the mass do not come at the digestive mucous membrane. Gelatine, probably in the same way, retards the digestion of food if too concentrated.

Too high a temperature retards digestion.—It is not merely that the gastric, and presumably the other digestive solvents, are decomposed by heat above that of the body, but the amount of secretion and the muscular acts necessary to forward solution are arrested by its local action. This applies principally to starchy foods, which are often taken hotter than at all suits the salivary glands. Meat has time to cool before it gets down to the laboratory prepared for it in the stomach.

The application of these rules to practice is not difficult; but it is obviously impossible to compare articles of diet unless they are of a definite quality; and, therefore, it will be understood that all those spoken of are supposed to be of the very best sort, and dressed in the way best adapted for securing their virtues.

Some years ago, I printed what I called a 'Ladder of meat-diet for invalids,'[1] which I will repeat in a future part of this volume, when we come to consider the regimen of the sick. I there conclude with roast joint of mutton, which is the 'promised land' of the convalescent; so, that dish may fairly here begin the list, which may form a sort of skeleton framework—from its actual or possible position in which may be judged roughly the comparative time which each article is likely to

[1] *The Indigestions*, p. 101, 3rd edit., Philadelphia, 1870.

require for its digestion. When time and strength have to be economised, or where a full quantity is required for purposes of nutrition, it is wise to adhere to the leading names on the list. Where moderation can be calculated upon, and full leisure secured, a healthy man cannot be called imprudent for indulging his appetite for variety by descending to the very bottom. Indeed, to do so, within reasonable bounds, contributes to high health; for it is certain that an important element in making the most of food is variety. It is not enough to supply in proper amount the proximate dietetic substance; both in our own race and in domestic animals there is risk of a falling off in condition unless different substances of the same class are employed in rotation. The very strongest, perhaps, can bear uniformity without injury, but to the average man or beast it is as finally noxious as it is distasteful. Dr. Parkes suggests that the good effect of variety is probably on primary digestion, improving the appetite and so causing more food to be taken by counteracting the cloying result of sameness.[1] But I think it goes further than that, for few can fail to have noticed in their own personal experience, if once the attention be called to it, how often a most indigestible dish, when partaken of as an occasional luxury, has seemed to sit easy on the stomach, and to nourish well though its quantity has been spare. The great art is to give it time and space, and to be moderate.

Dr. Parkes makes the further very practical suggestion, that where variety of sort of food is unattainable, variety of cookery, to a certain extent, fulfils the same object.

Table of Precedence in Digestibility of some Articles of Animal Food.

Sweet-bread, and lamb's trotters.
Boiled chicken.
Venison.
Lightly boiled eggs, new toasted cheese.

[1] Parkes, *Practical Hygiene*, p. 186, 4th edit.

Roast fowl, turkey, partridge, and pheasant.
Lamb, wild duck.
Oysters, periwinkles.
Omelette (?), tripe (?).
Boiled sole, haddock, skate, trout, perch.
Tripe and chitterlings.[1]
Roast beef.
Boiled beef.
Rump steak.
Roast veal.
Boiled veal, rabbit.
Salmon, mackerel, herring, pilchard, sprat.
Hard boiled and fried eggs.
Wood pigeon, hare.
Tame pigeon, tame duck, goose.
Fried fish.
Roast and boiled pork.
Heart, liver, lights, milt, and kidneys of ox, swine, and sheep.
Lobsters, shrimps, prawns.
Smoked, dried, salt, and pickled fish.
Crab.
Ripe old cheese.
Caviare.

The comparative digestibility of various vegetable dishes is easier to estimate than that of animal food; it is in a direct ratio to the facility with which they are reducible into a homogeneous mass, by mechanical means, from their natural form. And they are more readily digested if this reduction takes place through chewing in the mouth, rather than by mashing in the kitchen, as they in the first way become permeated more thoroughly by the saliva. If, on the score of defective teeth or other reasons, a preference is given to artificially broken-up vegetables, they should be retained in the mouth longer than is required by the mere preparation for swallowing.

The influence of the mind over digestion must not be forgotten. 'Bread eaten in sorrow' remains unabsorbed, and it

[1] The 'tripe' as made in America would seem from Dr. Beaumont's account to be more digestible than the rich dish we prepare from it here.

is not without reason that, even in the earliest times and among the most barbarous tribes, companionship during meals has always been sought. It is not only painful reflections which disturb the digestion; any concentrated thought is equally injurious, and injurious in a close proportion to the intellectual powers of the individual. The only people fit to feed alone are those fluttering butterflies whose intellects do not dispose them to concentrate their thoughts, and whose good luck exempts them from the need of trying. And even these instinctively seek society. To the brain worker and the body worker, cheerful distraction at meal times is a rule of imperious necessity, the habitual neglect of which entails chronic disease and the early failure of vital powers as a certain punishment.

The adjuncts of family meals should be studiously made as agreeable as possible. A change of clothes, clean hands, and courteous manners, should not be reserved for company, but enforced as a daily habit. If allowed to be omitted, it becomes a labour instead of a matter of course. Table decking is an elegant art, capable of exhibiting the good sense, as well as the good taste, of the artist, and highly promotive of ease of mind in the company, however small, or however familiar. If flowers are lacking, there are always leaves to be had, and I have seen toadstools with mosses and lichens so arranged as to form a centrepiece that Cellini must have praised. I do not see why we should not have music and singing at domestic meals, as well as at city feasts. All are not eating at once, and a change of performers might be kept up as long as required. The cook, also, should be encouraged to make the dishes which are exposed to the eye as pleasant to look at as possible, not so much by adornment, which is apt to be vulgar, as by concealing all that is untidy and suggestive of painful ideas. The forms of animals, in fact anything which makes us remember that the food has been a living animal at all, should never be conspicuously displayed, but rather covered with such vege-

table garnish as is capable of harmonising with the character of the dish.

Ease of body, as well as of mind, is requisite for complete digestion. Muscular exertion should be avoided immediately before and immediately after all substantial meals. The repose previous need not be long; a nap of forty winks, dressing, and washing, are usually enough to prepare even an exhausted pedestrian or hard rider for a good dinner. The best test of due preparation is a healthy appetite without any feeling of faintness or squeam. The rest after meals requires rather more judgment and self-control. Instinct induces us to take it, but does not tell us to avoid excess. Now, it is certain that to a healthy person excess is very possible. Sleep, for example, after dinner retards digestion, and allows the distended stomach to act injuriously on the circulation of the brain. It is proper only for very aged persons or invalids.

I have heard it argued by persons more ready at observing the facts of natural history than at reasoning upon them, or perhaps still readier at finding an excuse for laziness, that dogs and other carnivorous animals naturally betake themselves to sleep after a repast. That is true, but, then, it must be remembered, that in the wild state their chance of a meal comes but seldom, they must take the food when they can get it, and to guard against starvation overload their stomachs. The lethargy which follows is a necessity, and there is no evidence that it prolongs their lives. Those breeds of dogs which live most in the company of man, and feed on the mixed and cooked diet of their masters, usually give up the practice of sleeping after meals along with their gluttony, and to all appearance seem to suffer less frequently from indigestion than their cousins at the kennels, who require very careful treatment to preserve their health.

The best employment after a hearty meal is frivolous conversation, accompanied by such gentle sauntering movements as are encouraged by a well ventilated drawing-room or garden. Then is the time, also, for those true games where

luck and skill are so combined as to have the character of game and not of business.

I have ventured so far to go beyond what might seem the limit of a dietician's tether, because it is upon these social considerations that depends the determination of the best times of meals for healthy persons. For the heaviest repasts, those hours should be selected when we can secure to the fullest extent leisure of mind and body, and the opportunity of applying the aids mentioned above as tending to promote them. It is useless to prescribe the times for meals, or even their number, unless with a regard to the disposal of the remainder of the day, whether that is regulated by choice or necessity.

The intervals between meals, also, depend on the occupations which fill them up. Sleep retards digestion, and therefore a considerably longer period may be allowed to elapse between the last food at night and the first in the morning than is suitable during the day. Violent exercise of mind or body also retards digestion, and therefore, when this is practised, food is not called for so soon as on a day of rest. I have often observed that, in spite of a late breakfast, a keen appetite often comes on Sundays before one o'clock to lawyers and merchants, who on working days do not care to eat till two or three, nor even then. Whereas, busy medical men whose work is more continuous, though less severe, adopt the early Sunday dinner hour only with reluctance.

There can hardly be any exceptions to the rule, that after the night's sleep, and the long fast which has emptied the digestive organs, food should be taken before any of the material business of the day is taken in hand. Work done before breakfast is more tiring, and, with due deference to certain well-meaning enthusiasts for early rising, is not done so well as after the stomach has been fortified with what it must require, if in a healthy state. The hour of rising must, therefore, regulate the hour of breakfast. It is no proof of health or vigour to forego it without inconvenience, nay rather the

contrary; but it is proof of health and vigour to be able to lay in then a solid foundation for the day's labour. The natural appetite for food should be fully and completely appeased; and if there is a desire for meat, there is no reason for declining it; indeed, where mental work has to be done, it had better not be omitted. For mere bodily toil, a breakfast merely farinaceous, such as porridge, bread, milk, and butter, is most adapted, to which the usual additions *de luxe* may be made according to choice.

Not more than five hours should elapse before food is again taken. To some persons, from habitual neglect, the appetite does not arrive so soon; and then if they sit down to an unaccustomed luncheon, they feel stupefied by it, and quote this experience as an evidence that a mid-day meal is unwholesome for them. The stomach requires a gradual education after it has got into bad habits; so, beginning with a biscuit and a little milk, the patient should advance in quantity, till he arrives at the amount which is shown to be the proper amount by his sitting down to his subsequent dinner hungry and unexhausted. The proper amount varies much in different persons and different circumstances, and the only general description that can be applied to it is 'moderate.'

Instead of a light intercalary meal, some families prefer to take a substantial high dinner in the middle of the day. This seems to suit idle people and children, but if hard work has to be resumed immediately afterwards, very frequently indigestion is the result. It is the cause of that form of congestive dyspepsia to which the middle classes in Germany are extremely subject, and which drives them instinctively to eliminative mineral waters, like swallows to the South.

The best time for an adult's largest meal is when the business of the day is done, say, somewhere between five and eight. If it is taken earlier, there is time to get hungry again before bed-time; and if later, sleep comes too soon on the top of it. For light eaters the later hours, for heavy eaters earlier hours are most suitable. It may be observed that the court dinners

of city companies and the merry-makings of Greenwich ichthyophagists, where the guests meet to eat largely, are usually early.

It is superfluous for a healthy person, not influenced by any of the peculiar circumstances which will be hereafter considered, to devote special attention to considerations concerning the wholesomeness or digestibility of his dinner. He is apt to leave off this and leave off that, under the impression that they have once disagreed with him, till his bill of fare becomes most injuriously restricted. Variety in diet is of essential importance to health, and a succession of several imperfect or even unwholesome kinds of food is better than a monotonous repetition of a perfect aliment. Occasional feasts and occasional fasts constitute the natural mode of life for an intellectual and social animal. This paragraph applies to all meals, but I have inserted it apropos of dinner as being the principal.

By variety is implied, not a great number of dishes at once, which is confusing and oppressive, and destructive of the object aimed at, but a frequent (why not daily?) difference in the principal dish, to which the few other accessory dishes are harmonised. Some of the most appetising dinners one has ever eaten have really consisted of one article, novel and unexpected. The famous Mrs. Poyser sagely remarked that a man's stomach likes to be surprised, and no surprise is possible if the same monotonous superfluity is repeated day after day.

In the course of the evening a cup of tea seems to give a fresh fillip to digestion, and supplies liquid which is required for solution of the viands. Some persons are afraid of its keeping them awake, and will find a good substitute in extempore lemonade—a cup of hot water poured on a slice of lemon, some chips of the rind, and a lump of sugar. But tea of an afternoon is by no means to be recommended. The habit of taking it began as a sort of fashionable whim about a dozen years ago, but has spread so far downwards through the

middle classes that medical men ought to exert themselves to stop it. If the dinner hour is so late that too long a time interposes between it and luncheon, let the latter be moved onwards, and, if necessary, breakfast also. For the dilution and washing away of the gastric secretion weakens its power of digesting the subsequent dinner, improperly blunts the appetite, and not unfrequently generates flatulence and dyspepsia. A biscuit, and an orange or an ice is a much less injurious indulgence at the same hour.

A man in health ought to be satisfied with three meals a day, and should educate his stomach to take enough at them to supply his requirements. The practice of constantly nibbling at odd times induces a flow of saliva almost continuous, like that of herbivorous animals, and neutralises the gastric juice, so that meat is not fully digested.

The last meal should be sufficiently late for the whole not to be absorbed before retiring to rest. Going to bed hungry is liable to induce a habit of restlessness at night. If business or pleasure keep you up much longer than usual, it is better to take a light farinaceous supper, which, in this case, induces sleep. This, however, is a very different thing from sleep in a state of repletion, which (as was before observed) disturbs the circulation in the brain, producing painful dreams, unrefreshing rest, and feverishness.

An average adult may consider that he is taking enough to supply the ordinary requirements of healthy activity, if he eats in twenty-four hours the equivalents of a pound of meat and two pounds of bread. The English soldier, on home service, receives from Government $\frac{3}{4}$ lb. of meat and 1 lb. of bread, and he buys about $\frac{1}{2}$ lb. additional bread and 1 lb., or so, of other vegetable food.[1] Dr. Parkes calculates that this quantity of nitrogenous aliment is somewhat deficient for the maintenance of high vigour, so that I have ventured to add $\frac{1}{4}$ lb. of animal food, reducing by a few ounces the supply of vegetables.

[1] Parkes, *Practical Hygiene for Medical Officers of the Army*, p. 523.

The nearer a man approximates to this allowance the better, if he has no individual peculiarities of size, temperament, occupation, climate, or state of health to allow for. To all but exceptional cases, anything beyond this is excess—not hurtful necessarily, perhaps even beneficial as an occasional change, but still an excess. To continue such excess as a daily habit, puts a person in a position more prone to ill health than he would be naturally. To err by defect is equally injurious if persisted in; but it has this advantage, that it oftener obtains a compensation which to a considerable extent rectifies the balance. Thus, the soldier at home, above quoted in illustration, gets frequent little treats, partly out of his own and partly out of others' pockets, which fill up the corners left by the government ration. And, perhaps, the most perfect diet is one just within the limit proposed, with an occasional transgression as a change.

It is possible, certainly, for a high liver to make an equivalent change by abstinence; and if he is lucky enough to be ill and go to a doctor, he is perhaps advised to do so; but I have never yet known one to fast voluntarily as a preservative to health, though he must have often felt the beneficial effects of its being forced upon him. It is forced upon him, sometimes, as a direct consequence of the habit of overeating; a surfeit of accumulation comes on, or he brings it on by going a little further than usual, and then nausea and loss of appetite perform the good office of making a change by cutting off the supplies. Unless relieved in this way, the high liver gets torpid and stupid by day, restless by night, there is a sluggish circulation in the veins from the overloading of the blood with useless material, there are congestions and engorgements of the internal organs, and dark dirty discolorations of the skin, thick urine, flying unaccountable pains, neuralgia, rheumatism, gout, obesity.

The evils of too great restriction of food will be considered in a future chapter, when we come to the subject of poverty as a modifying circumstance in dietetics.

CHAPTER V.

NUTRITION.

With the passage of the liquefied alimentary substances through the mucous membrane lining the tube, digestion, strictly so called, ends. Anything which afterwards occurs to the incoming matter may more properly be classed with nutrition.

Prominent among the needful changes in the material for building up the tissues, stands that which takes place in the liver. The biliary secretion from this organ has been spoken of in the previous chapter as taking a part, though not a leading part, in the solution of fat in water, as staying the too rapid decomposition of albuminous food and excretory matter, and as supplying some of the liquid vehicle in which the aliment is conveyed through the walls of the digestive tube. In all these the liver is subordinate, and its place may be readily supplied. But the anæmic degeneration of the blood, the gradual pining emaciation, and ulceration of the tissues, and finally death, which follow its suppression—all of which point to some deficiency of assimilative capacity and not merely to the stoppage of an excretion—show that it performs in the circle of life some special duty which cannot be spared or replaced by another gland. The blood going into the liver is altered before it comes out of the liver much further than is involved in the mere formation of bile.

During the last thirty years, the changes, necessary to life, wrought on the blood by the liver have engaged a large share of the attention of physiologists. I have been comparing the

account which I printed in 1856[1] of what had been done up to that time with those of the present day, and I find a progressive advance towards the light, which seems to promise our sons not only interesting, but practical knowledge. It was then established that 'a copious amount of sugar is formed in the cells, and is forwarded into the hepatic vein, but not into the bile ducts,' and 'that the sugar is formed in consequence of taking food.'[2] It has been now ascertained that it is not only an immediate consequence, that the sugar does not pass from the food into the liver, but that the sugar-making in the cells of the gland continues for a long time after the alimentary canal is emptied. It appears, moreover, that the sugar, though more copious even than had been supposed, is a very transitory stage in the circle of chemical changes. It is so momentary that it can be made evident only by an artificial arrest, just as electrical action in the earth, though so vast in its results, touches our senses only through the partial derangement which shows itself in the lightning's flash.

But let it not be reckoned as of small moment because of its latency. It is an observation as old as Thucydides, that the influential forces in the world are the most active when most unnoticed; for, indeed, perturbed crises are usually the results of their disturbance. We may see in diabetes the serious evil of the further conversion of the sugar being interfered with, and of its remaining in the blood only to run off by the urine; and we can hardly doubt that the breach of a previous link in the chain, the formation of sugar, may cause equal discomfort and explain at a future time some obscure morbid states.

Those who take delight in the glimmering through the mist of future light, will find much to interest them in Dr. Dalton's sketch of this subject, and the details of the experiments repeated by himself, with ingenious precautions to avoid error, in the ninth chapter of his 'Human Physiology.'

[1] *Digestion and its Derangements*, chap. vii. [2] *Ib.* p. 160.

That the spleen and lymphatic glands take also a part in nutrition, or blood-making, is pretty clear, but which part is entirely unknown.

The defectiveness of our information about the stages and machinery of nutrition does not, however, prevent us from having a clue to a good deal of practical knowledge of the comparative NUTRITIOUSNESS, for different purposes, of different kinds of diet.

By nutrition, two ends have to be accomplished, the growth or repair of the body, and the production of motion or force. The first indication is more or less fulfilled in proportion to the quantity of digestible nitrogenous material, the latter in proportion to the quantity of digestible carbo-hydrates which the aliments contain. It is very clear that the digestibility must be insisted upon, otherwise we should make serious mistakes in our valuations of food. For instance, according to the well-known table of M. Payen, a pound of chestnuts and a pound of milk contain very nearly the same quantity of nitrogen; yet, to expect that a baby would grow as well upon one as the other would be criminal folly. When, then, circumstances require us to foster growth, to increase the vigour of the muscles and nerves for short temporary exertions, to replace preternatural wear and tear, meat is valuable in the direct ratio of its solubility in the stomach. When the regular performance of a daily round of moderate exertion alone has to be provided for, carbo-hydrates in the form of farinaceous and oleaginous food may with advantage constitute the chief of the diet. So that before giving any general rules for the selection of a dietary which will best perform its duties, it will be needful to review the special circumstances for which it is required, which I propose to do in respect of normal conditions in the second part, and in respect of morbid conditions in the third part of this volume.

PART II.

SPECIAL DIETETICS OF HEALTH.

CHAPTER I.

REGIMEN OF INFANCY AND MOTHERHOOD.

It may be presumed no Englishman doubts that the best food for a new-born infant is a mother's milk.[1] Even deviations from the normal condition of the general system, or of the breast, should not be allowed too readily to deter a mother from suckling, till there is evidence that the secretion is disagreeing with the child. Unless diarrhœa or thrush occur, it may be taken for granted that proper nutriment is afforded, and if proper nutriment is afforded, we may be sure a woman's health is not affected by the inconveniences which she may be enduring.

I have known a woman, unable to feed herself from severe rheumatic fever, have her child held to her breast and be nourished only from thence, without any harm following. And in several instances slight inflammation of the breast has seemed to be benefited by the flow of milk induced by suckling. Indeed, I have once seen a breast with an abscess in it supply healthy nutriment to a child, the mother feeling sure that the abscess did not communicate with the lacteal tubes. I fancy no medical man would sanction a persistence

[1] Strange to say the opinion is not universal. Dr. Brouzet (*Sur l'Éducation Médicinale des Enfants*, i. p. 165) expresses a wish that the State should interfere and prevent mothers from suckling their children, lest they should communicate disease and vice! A still more determined pessimist was the famous chemist Van Helmont, who thought life is reduced to its present shortness by our instinctive infantile propensity, and proposed to substitute bread boiled in beer and honey for milk, which he calls 'brute's food' (in the chapter 'Infantis nutritio ad vitam longam').

in the latter risk, but still it were to be wished that our accoucheurs would be somewhat less hasty than they generally are in debarring mothers from suckling on slight grounds. A certain injustice is inflicted on the child, and a problematical benefit conferred on the parent.

During the months of suckling it should be the object of the mother first to provide herself with an appetite, and secondly to provide herself with proper food. The appetite often fails simply from want of fresh air, especially in those who are used to enjoy it, the remedy for which state of things is sufficiently obvious. Sometimes the disrelish for food is a symptom of the exhaustion induced by the labour, and then small doses of sal volatile or a light bitter, such as gentian, will remove it. Sometimes it is a direct gastric anæmia, arising from going too long without food. The patient should eat directly she begins to feel hungry, and not wait to feel very hungry. But at the same time she should be careful not to overload the stomach; in fact, though she eats often, she should not eat more than when in ordinary healthy exercise. A great mistake is often made by endeavouring to supply the wants of strength and appetite by an extra supply of wine or malt liquor. The nurse should never take more than she is accustomed to; if she does, it makes her eat less and digest less, though she does not feel the debility which is the consequence of the innutrition. Beer increases the quantity of the milk, just as it increases the quantity of the urine, but it also renders it thin and watery in the one case as in the other. Indeed less than she is accustomed to is the more rational rule of diet, for the happy peaceful circumstances of her situation usually exempt her from the mental wear and tear, and the exhaustions of the nervous system incidental to social life which it is the special purpose of alcohol to compensate.

The most proper food is cow's milk, fresh and unskimmed. It can be taken at all times, in a great variety of forms, and nobody has ever been known to take too much. If it turns sour, lime water mixed with it not only corrects its aces-

cence, but also supplies a valuable aid to the growing bones of the infant. In the solid dietary again, milk may fairly be taken as the type of the due admixture of alimentary principles, because not individual growth, not the production of force, but the secretion of that very substance is the object of the selection of diet. So that we cannot do better than take the proportions of nitrogenous, carbonaceous, and aqueous constituents of the lacteal secretion as a guide to the proportions of these principles in the diet of nursing mothers. Analyses of milk are to be found in all physiological works, and if it be reckoned roughly that in food as presented for our consumption, there is 50 per cent. of combined water, I think it will be found that the following scale of diet corresponds pretty closely to the proportion of the several constituents there enumerated.

Supposing the full diet to consist of three pounds of solid food, that will require six pints extra of uncombined aqueous fluid to make it as fluid as milk. And the three pounds of solid food should consist of

14½ oz. of meat,
13 oz. of fat, butter, sugar,
20 oz. of farinaceous food and vegetables,
½ an oz. of salt, lime, &c.

Small women and small eaters, especially if they have small children to bring up, will require less; but let the reduction be proportionate in each of the several classes of alimentary substances. And at first from the exhaustion of parturition, from the want of exercise and of fresh air, the appetite turns against meat. Let then milk, especially boiled milk with arrowroot or the like, chicken broth, egg custards, fill up the deficiency. Only insist that enough is taken.

The observations by Dr. Barker of New York on this subject are so much to the point that I cannot forbear quoting them. He says, 'Give the puerperal woman as good nutritious food as she has an appetite for, and can easily digest and assimilate. You will at first find many nurses who will not

accept these views, and they may fail to carry out your directions in this particular; but my experience has been that after a time the intelligent ones become enthusiastic converts to this course. . . . Your patients rest and sleep better, and their functions are established with less disturbance than they would be with a spare or insufficient diet. Since I have adopted this measure with my puerperal women, I am very sure I have much less frequently met with those annoying and troublesome nervous phenomena that so commonly follow parturition, as the nervous system is then apt to be in a condition of exalted susceptibility. The function of lactation is thus generally established without that disturbance of the system called milk fever, formerly so common.' [1]

It may be noticed that the Professor says nothing about wine and malt liquors. They are conspicuous by their absence in his dietary. And in truth the less a nursing mother takes of them the better, so that her temper and digestion do not obviously suffer from the restriction.

The child should be put to the mother's breast as soon as she wakes from her first sound sleep after its birth. The waiting for three or four days is an old-fashioned relic of the days of drugging, when it was considered wrong that the young bowels should be relaxed by the colostrum of the first milk, but right that they should be griped with castor oil. Not to use the first milk is wasteful and injurious. The best substitute for it is cow's milk diluted and sweetened as hereinafter described.

The education of the infant must begin immediately after birth. In the first place it has to be taught to suck, for which every monthly nurse has her own device, and will only laugh at any male who should presume to interfere. Next it has to be taught not to be always sucking, whenever the whim takes it or the mother comes in sight. Regular definite times, the intervals between which are gradually length-

[1] 'The Puerperal Diseases,' *Clinical Lectures delivered at Bellevue Hospital*, by Fordyce Barker, M.D., p. 27.

ened as the child's strength and growth allow, give a rest both to the stomach of the receiver and the breast of the giver, which conduces to the due digestion of the nourishment. As a general rule the daily allowance of milk required by a healthy infant is on the first day very small indeed; on the second day it takes about a quarter of a pint; on the third day two thirds of a pint; on the fourth or fifth day it will consume a full pint. And this quantity augments gradually till by the sixth month you must not calculate on less than two pints being wanted. The distribution should be in an inverse ratio to the quantity. During the first two months the child should have the breast eight or nine times daily, if the quantity yielded is small, and six or seven times if it is large. After that a gradual reduction may be begun, which before weaning should have arrived at the number of four meals daily, which is the most proper for the digestion of mixed diet.

If a mother, with or without reasonable cause, deputes her duties to a wet nurse, she ought thoroughly to understand that the expedient is not without drawbacks. All the best accoucheurs agree that in choosing a woman for the office, observation of the figure, the complexion, the colour, the teeth, or even the shape and development of the breasts, and the analysis of their secretion are all unimportant compared with a knowledge of the regularity of the catamenia. In this respect, it stands to reason we must take the applicant's own character of herself, a serious temptation to dishonesty. An unmarried woman may not improbably have a concealed constitutional taint which is communicable through the milk, and at the best is an unpleasant inmate in the family. A poor married woman, however respectable, is removed from a starving home to sudden abundance, and invariably overeats herself, and it is fortunate if she does not overdrink herself too. She pines and grows anxious about her own child if it is alive, and insists upon having her troublesome husband to see her openly or secretly, on the pretence (a fallacious one)

that his visit increases the flow of milk. Moreover, a rich mother cannot but feel some compunction in purchasing for her own offspring what is stolen from another, who is sometimes seriously affected by the fraud, and retires disgusted from this false world.

At all events, a trial ought to be first made, under the superintendence of a medical man, of fresh cow's milk or goat's milk, and of Swiss condensed milk.

Cow's milk should at first be mixed with half its bulk of soft, pure, tepid water, in each pint of which has been suspended a drachm of 'sugar of milk' (which is procurable at any chemist's, being used for grinding up powders) and two grains of phosphate of lime finely powdered. If the milk has been partially skimmed, as is often the case in cities, then a good tablespoonful of cream should be added to each pint, to make the mixture equal to human. If it has not been skimmed, a couple of teaspoonfuls of cream is sufficient.[1]

The advantage of using goat's milk, is that the animal can be brought up to the very nursery, even in cities, and will supply nourishment directly to its little master's lips if called upon. Children do not seem to dislike the peculiar taste.

Swiss milk has been already alluded to in the second chapter of the first part (p. 59). No inconvenience has as yet been proved to arise from its use, but, at the same time, no superiority to fresh cow's milk has been confirmed. As it is already sweetened in the preparation, no additional sugar is

[1] In the above recipe household measurements are used as the nearest possible approximation to the following formula:—

Whole cow's milk	600 parts,
Cream	13 „
Sugar of milk	15 „
Phosphate of lime	1½ „
Water	339½ „
	1,000

(*Dict. Encycl. des Sciences Méd.*, art. 'Lait,' 1868.)

required, but care must be taken to dilute it sufficiently to make it resemble not ordinary milk, but milk and water.

Laputa never devised anything more preposterous than Liebig's food for infants.' It is composed of malt flour, wheaten flour, bicarbonate of potass, water, and cow's milk, and the following is recommended as the simplest mode of cooking it:—

Take of wheaten flour ½ oz.
Malt flour ½ oz.
Bicarbonate of potass 7¼ grs.
Water ½ oz.
Mix well, and add of cow's milk 5 oz.

Warm the mixture, constantly stirred, over a very slow fire till it gets thick. Then remove the vessel from the fire, stir again for five minutes, put it back on the fire, take it off as soon as it gets thick, and finally let it boil well. Before use, strain through a muslin sieve.

The object of all this is to convert the starch of the flour into dextrine and sugar, and to elaborate a product which after all is not nearly so like the natural sustenance as may be made with cow's milk, water, and a little additional sugar of milk. It is needless to say what a number of unnecessary risks are incurred of some one of the numerous articles employed being adulterated, of inaccurate measurement, of dirt, and of careless preparation by tired servants, who, it will be observed, have to keep the fire low for the first part of the process, and then to coal it up, making no small smoke, for the final boil. Sensible parents will be content to leave the recipe for some coming race who may prefer art to nature.

It is advisable to nourish the infant directly from the breast; and where this cannot be done, as soon as possible after the milk is drawn. Our senses tell us of a peculiar aroma given off by fresh milk which quickly exhales, and appearances seem to warrant the conclusion that this contributes to soothe the sensitive nervous system of the suckling, and so assists digestion.

The best diet for an infant during the first six months, is

milk alone. It is true, man is a tough animal, and can stand with impunity much rough usage, and therefore a vigorous baby often seems none the worse for a certain quantity of farinaceous food; but the first appearance of flatulence, gripes, screaming, ill temper, or other ways infants have of complaining of dyspepsia, should make the nurse desist from these attempts to hurry on natural development.

It is only when the coming teeth are on their road to the front that the parotid glands secrete sufficient saliva to digest farinaceous food. When dribbling begins, then is the time to begin with the various preparations of these substances bountifully supplied by nature and art. Till then, anything but milk given to a healthy baby must be tentative, and considered in the light of a means of education to its future dietary, and must not take the place of milk.

Among the various means of education, I would select as most generally applicable broth or beef tea, at first pure and then thickened with a little tapioca or arrow-root. Chicken soup, made with a little cream and sugar, serves as a change. Baked flour, biscuit powder, and tops and bottoms should all have their turn; in fact, change is necessary, or the child is apt to get too fond of its soup, and to neglect the really essential nutriment of milk, and to wean itself prematurely.

The consequences of premature weaning are most disastrous, but insidious. The child continues to present the external aspect of health, its muscles are strong and elastic, but the bones do not grow in equal proportion. It is active and anxious to walk, but the limbs give way and become distorted. If it is ill enough to be taken to a medical man, he calls the condition 'rickets,' but there are crowds of poor creatures affected in this way whose parents refuse to see that anything is wrong till the malady has gone too far for cure. The suspicion that rickets was due to this cause has long been prevalent in the profession, but it is to M. Jules Guérin that we owe the proof derived from direct experiment. This patho-

logist found not only that rickety children had almost invariably been prematurely weaned, but that the disease was capable of artificial and intentional induction. He took young puppies and young pigs, specimens respectively of carnivorous and herbivorous animals, and he produced a rickety softening of the bones of each by removing them early from the mother, and giving the one set meat and the other set vegetables before the natural period. Professor Trousseau has backed the deductions of M. Guérin with his valuable *imprimatur*.

The time for weaning should be fixed, partly by the almanac, partly by the growth of the teeth. The troubles to which children are liable at this crisis are usually gastric, such as are induced by hot weather; so that in summer it should be postponed, and in winter hurried forward. The first group of teeth nine times out of ten consist of the lower central front teeth, which excite no wonder in any but very young parents by appearing any time during the sixth and seventh month. The mother may then begin to diminish the number of suckling times; and by a month she can have reduced them to twice a day, so as to be ready when the second group makes its way through the upper front gums to cut off the supply altogether. The third group, the lateral incisives and first grinders, usually after the first anniversary of birth, give notice that solid food can be chewed. But I think it is prudent to let milk, though not mother's milk, form a considerable portion of the diet till the eye-teeth are cut, which seldom occurs till the eighteenth or twentieth month. At this period even very strong children are liable to diarrhœa, convulsions, irritation of the brain, rashes, and febrile catarrhs. In these cases the resumption of complete milk diet is advisable, and sometimes a child's life has been saved by its reapplication to the breast. Now these means are the most readily feasible when the patient is accustomed to milk; indeed if he be not so, the latter expedient is hardly possible.

CHAPTER II.

REGIMEN OF CHILDHOOD AND YOUTH.

The diet of childhood requires from its rational guardians as much attention as that of infancy. The passions at this age overpower the instinct, and reason has not yet asserted its throne. Children should have four meals a day, but meat only at one, or at most two; the latter when only a small portion at once is allowed. When in health they should have no wine or beer except as a festive treat, no coffee, strong tea, or other exciting drink. Once cooked succulent meat without sauces or condiments, eggs, plenty of farinaceous pudding, mealy potatoes, carrots, spinach, French beans, rice, bread, fresh butter, porridge, roast apples, oranges, should form the staple of the nursery commissariat.

As to quantity, we may take the full diets of hospitals as fairly representing what should be the minimum proper for those who are not restricted by fortune in the matter of food, and the mean amount upon which a growing child can continue to flourish. For it may be observed that while all extravagance is herein avoided, the food is intended mainly for those who are convalescent from acute disease, and have not only to remain well, but to recover flesh.

The following estimates are taken from the published tables of diet. The quantities named are those which may be fairly put before each child of each article, and by selecting the larger quantities we may give a very full allowance. If the smaller amounts of one are eaten, then care should be taken that the fuller weights of others are chosen.

And let it always be understood that food is not to be dispensed with pedantic accuracy as if it were a pharmaceutical prescription. Even in hospitals considerable latitude is allowed, and still more in private nurseries should we avoid making life a toil by too much interference. It is only in cases of prominent and persistent excess in one direction or the other, that we should bring our adult reason to bear on infantile instinct.

Full Dietaries for Children at various Hospitals.

Age	Bread	Butter	Milk	Meat	Vegetables	Pudding	Hospital
Under 7	unlimited	1 oz.	¼ pint	2 oz.	4 oz.	unlimited	St. George's
Under 7	12 oz.	?	½ pint	2 oz.	8 oz.	twice a week	London
Under 8	5½ oz.	about ⅔ oz.	½ pint	2 oz.	4 oz.	¼ pint	Children's Hospital, Great Ormond Street, and Evelina Hospital
Under 8	8 oz.	about 1 oz.	?	2 oz.	4 oz.	0	Leeds Infirmary
Above 8	8 oz.	about 1 oz.	¾ pint[1]	3 oz. broth ⅓ pint	6 oz.	gruel ⅓ pint	Children's, Great Ormond Street, and Evelina Hospital
Under 9	6 oz.	?	1 pint	2 oz.	6 oz.	½ pint gruel or broth	Birmingham General Hospital
Under 9	7 oz.	½ oz.	1 pint	4 oz.	4 oz.	to order	St. Bartholomew's
Under 10	12 oz.	¾ oz.	1 pint	2 oz.	4 oz.	6 oz.	St. Thomas's
Under 10	6 oz.	?	1½ pint	2 eggs	?	8 oz.	King's College

Extreme monotony should be avoided. It is a great inconvenience to young persons in after life to have been brought up in such a narrow round of indubitably wholesome victuals that they cannot eat this or that. They should especially be guarded against family whims; and if the parents are conscious of prejudices against any of the ordinary

[1] Including what is put in mashed potatoes.

foods of mankind, they should educate their descendants to take these as a matter of course. For it is astonishing how ingrained some of these acquired idiosyncrasies become, and indeed after full manhood they may be concealed but are never quite overcome. Yet few of the minor thorns in the rose-bed are so vexatious to oneself and others. I shall not soon forget the annoyance of taking a young man to a Greenwich dinner, and finding that he never ate anything which swam in the waters. Thus occasional abstinence, in the shape of no meat or the substitution of fish, and occasional festivities, consisting of food given deliberately because it is nice, are not out of place in the nursery. Most kind fathers and mothers act on this principle, but they sometimes needlessly let the indulgence trouble their conscience.

The articles of diet should be as good and as clean as can be obtained, but no criticism should be permitted to those who sit at table. A boy or girl should be ready to eat anything which is set before them, and not refuse even badly cooked or strange meats; for in roughing it through the world, whatever position they are in, the choice often lies between that and going without.

The plan adopted at many schools of working before breakfast is not conducive to health. If it is inconvenient for the household to prepare the meal immediately the pupils are dressed, the most that should be exacted is the repetition of some light task prepared overnight; but better than that is to let them have half an hour's run in the play-ground. Violent exertion also of mind or body before and after other meals should be discouraged by a suitable arrangement of the hours of work and play. Æsthetic pursuits, drawing, dancing, singing, may be made so to combine relaxation and amusement as to leave the powers of digestion unexhausted, and may be practised up to the time of meals.

To the full development of the digestive organs, muscular exertion in the open air is essential, and it is doubly valuable when it is of a pleasurable character. Proper exercise always

involves a rational style of dress; for ill fitted and uncomfortable clothing is soon rejected by those who rejoice in the natural movement of the limbs.

It is even more necessary for girls than for boys that a sufficient playground should be attached to places of education, for they cannot be allowed to wander about the country like their brothers, and the funereal processions falsely called exercise are almost useless. In towns gymnastics or riding on horseback may be made substitutes for games; but the money required for these would be much more profitable if expended in the rent of a field or lawn.

For families who are so fortunate as to be near a river or lake there is no exercise for girls so good as rowing a light oar or sculling. It opens the chest, throws back the shoulders, straightens the back, and ensures the shoulder straps of the dress not impeding movement, so that the liver and stomach gain space to act.

Many a sculpturesque figure will acknowledge her debt to her boat for her beauty; and a few weeks' instruction in swimming at Dieppe or Trouville takes away all sense of danger from the amusement.

Up to the period of puberty the daily use of wine should be allowed only during illness and by the express advice of a medical man. Its habitual consumption by healthy children hastens forward that crisis in their lives, checks growth, and so habituates them to the artificial sensation induced by alcohol that they can scarcely ever leave it off when they wish. This restriction does not exclude occasional festivities, and boys in active exercise seem to digest well a glass of well brewed beer at dinner.

Between puberty and full growth the principal thing we have to guard young people against is overloading the stomach. Their meals should be sufficiently frequent to avoid this, otherwise the stomach from habitual distension becomes larger than is appropriate for the size of the trunk, and there is in after life a tendency to gastric flatulence. Lads sent to learn a business

in the city are often much neglected in the matter of a midday meal, and have to make up for it by gorging themselves in the evening. This spoils their breakfast next morning, and they really get starved from over-repletion. The best luncheon a growing young man can have is a dish of roast potatoes, well buttered and peppered, and a draught of milk. Or the same vegetable with a little bacon or fish may be made into a Cornish pastry, which if wrapped up in flannel will keep hot for several hours. In the summer boiled beans and bacon, or bread and cheese and lettuce with a glass of claret or a draught of bitter beer, may take its place. But let the repast be confined to one dish, and then they will not eat too much. Red meat in the middle of the day is too heating during active life, so that if the conventional form of a sandwich is the only convenient lunch found practicable, let it be made of eggs, or fowl or cold fish, flavoured with a little salad dressing, or the like.

Youth is the time when gluttonous habits are acquired. The commencement of them is easily detected, and they should unsparingly be made as disgraceful as they really are. Ridicule is not always a wise engine to employ in education—it is too powerful—but against gluttony it may fairly be used. Let it not, however, be supposed that excess in gratifying the palate is at all a laughing matter. It is a vice just as truly as sexual excess is a vice; and there is the less excuse for its becoming an habitual vice, in the fact that the temptation to acquire it is strongest in youth, and becomes weaker as full growth is attained. That it is regarded as a serious vice by the highest authority is shown to all time by that wonderful history of the civilisation of a specially favoured race preserved in the commonest of books. Kibroth-Hataavah—'The Graves of the Greedy'—remained for future generations as a standing memorial of Heaven's wrath, and of the natural punishment of sins against natural law. The worldly Lord Chesterfield is equally explicit in denouncing the vice, when writing to his son at school, and though his outspoken

sentences are couched in language too old-fashioned for quotation, they are well worthy of the attention of both parents and children.

The gorging themselves with pastry and sweetstuff at the confectioner's, as practised habitually by school-boys, and often by girls when they get a chance, lays the foundation not only for indigestion in after years, which is its least evil, but also for a habit of indulgence which is a curse through life. A schoolmaster who should effectually check this without needless restriction of liberty, and make greediness unfashionable among his pupils, I would rank far above the most finished scholar in Europe. An important step towards it is to give the boys enough to eat at regular meal times.

Yet are asceticism and hypocrisy to be equally eschewed with gluttony. The hearty enjoyment of what is pleasant to the taste at proper times is quite consistent with, indeed usually goes along with, habitual temperance; and one of the most practical lessons knowledge of the world can teach is that all pleasure is enhanced by self-restraint.

Young people should not be brought up to the habit of taking physic. As a rule, the British mother is very fond of dabbling in doctoring, and apt to try her first experiments on her own family. If there is any definite disease discoverable, a professional man is called in, but if a child is only weakly, or troubled now and then with unimportant ailments, she tries this and that which has been recommended by her friends, without suspecting the probable truth that the cause of the imperfect condition lies in some irrational regimen pursued. She cannot make out what is the matter; surely it would be wiser to consult some one who can, or at all events, who knows that he cannot, and will not act till he does. The consequence of frequent drugging is sometimes real illness, generally a debilitated state of the digestion, and almost always a disposition to fly to drugs for the immediate relief of petty inconveniences, which in reality impedes their cure by more far-sighted means. Boys get laughed out of this at

school, but girls are seldom so fortunate, and grow up with the idea that something which calls itself physic is a necessity of human life. Now, in all the pharmacopœias there is not a single active article which, joined to its virtues, has not the vice of deranging more or less gastric digestion. It is that which makes it a medicine and not a food. Assuredly, its secondary or final effect in suitable cases, is to restore digestion, but when taken needlessly, it cannot but be injurious even to such a tough animal as a boy. The proper place for the family medicine chest is, not the bed-room or the boudoir, but the store-room, where there is some little trouble in getting at it, and where it should be locked up along with a stomach-pump, and other provisions for emergencies to be applied by skilful hands.

CHAPTER III.

COMMERCIAL LIFE.

The continually increasing numbers who devote themselves to commercial pursuits, and the still larger numbers whom they influence as dependants as they grow in importance, make the habits of the class a matter of serious social consideration.

The commercial man measures his usefulness in the world by his success in rapidly accumulating honest wealth. Honesty, therefore, being presupposed, the most conscientious is always liable to the temptation of wishing to compress two days' work into one, so as to be rich in half the time taken by his neighbours. To speak of this as a 'struggle for life,' is silly; of those who labour hardest in our cities, there are very few who would not acknowledge that one tenth of their anxious toil would supply the daily needs of themselves and families. They are in reality egged on by ambitious rivalry, which uses for its purposes that insatiable hunger for hard work innate in the British breast. The haste to be rich is most unwise, and not only often defeats its own purpose by prematurely incapacitating the haster from further struggles, but if it is successful, it surely deprives middle life, or at least old age, of its occupation.

A man whose unusual exertions have made him rich rapidly, is sure to have been too much engrossed by his business to take an interest in other things. He may have kept himself, as a duty, acquainted with the pursuits and

sympathies of his fellows, but he is incapable of making them the occupation of his thoughts. He is driven to look to the past only for the genuine interest of life.

Much more often the health suddenly breaks down before the desired object is attained, and the power is wanting to engage in other pursuits, to take the place of business which is perforce given up. The expenditure of strength, in the hurry to grasp wealth, has resulted only in weakness and poverty.

It was a piece of shrewd advice administered by an old merchant to a young one—'If you want to die rich, live as long as you can.'

The most important rule for one engaged in any business which involves headwork or responsibility to lay down for himself is to strictly confine his business to its own times and places. Retail shopkeeping of all employments allows the greatest number of hours to be occupied in attention to its interests; for, if fairly prosperous, it does not exhaust the brain, and yet offers the gentle stimulus of movement and conversation. However, the principals of many large concerns of this kind are more heavily weighted, and if they want to enjoy health must draw a strict line between the hours devoted to money-making and those devoted to living, just as much as if they were merchants or manufacturers.

The result of a neglect of this rule, of bringing the counting-house into the dining-room and bed-room, is indigestion and sleeplessness.

The principal meals should be breakfast and dinner, breakfast before and dinner after the work of the day. But a break in the middle for luncheon is very important, indeed is imperative for all but exceptional cases. At breakfast and dinner, animal food is necessary to a hard worker; but it is not required at luncheon, and often causes heaviness and feverishness during the afternoon. Any large quantity of fat or butter also seems heating, especially if it is cooked, as in pastry. Farinaceous food, vegetables, fruit, should be the

staple of the midday meal, with only so much of anything else as is wanted for a relish, the less the better.

Many commercial men give up vegetables because they find that taken at a mixed meal, along with meat, they cause flatulence. If they will separate the two classes of food which require the digestive powers of different and somewhat opposite solvents, the saliva and the gastric juice, if they will take vegetables at one meal and meat at another, they will often find the difficulty overcome, and full quantities of both digested without fermentation.

The habitual use of stimulants in the middle of the day is to be deprecated; nevertheless where an unusual amount of cerebral exertion has been gone through, a cheerful glass of wine or beer will often prevent over-fatigue—let not, however, the demand or the supply grow a daily habit.

The daily use at dinner of a moderate amount of alcohol in some form, contributes, I am sure, to the health of brain-workers. Light perfect wine is the best form, next beer, next strong wine and water, last spirituous liquors.

Commercial work can be done only in the town, and it must be confessed that town air and influences are not the most favourable to health. On this score many now-a-days spend their nights at long distances from their place of business, so that no more time than is absolutely essential should be spent at a disadvantage. The success attendant upon this plan of residence in the country is closely proportioned to the earliness of the time at which business can be left. Unless an hour or two can be given to relaxation in the purer air before dinner, I do not think the labour of rushing backwards and forwards is compensated for. It is pleasant, doubtless, to see the junior branches of the family flourishing among green fields, but not when the bloom is gained by the exhaustion of the bread-winner's strength. Those who can afford it, will do better to fix their permanent residence near their work, and live temporarily in the country for a few months during the long days.

Besides the reason mentioned above, another may be given for the long hours borne by retailers, namely, that their shops are better ventilated and lighted than most of even the wealthiest merchants' counting-houses. To pass from the magnificent dwelling of his wife and daughters to the dull stuffy den of many a prince of commerce, recalls the image of Samson grinding in the dark through the treason of his money-loving spouse. Things were not so bad when the family lived over the offices, and a softening female influence civilised the whole house. But now work and life seem to be seeking a divorce from one another, and the place of business is growing more and more gruesome, and, like another ill-omened locality, is not to be alluded to in polite society. A ladies' mission for the improvement of these dwellings is urgently called for. Unlike other missions, it could dispense with promoters, secretaries, speeches, committees, subscriptions, and collectors. Or rather, all these agencies united could embark in the family conveyance, or even in a one-horse fly, and begin operations at once with a builder and decorator as assessor. The scale of expenditure should be proportioned to that of the other home; it will probably add very little to the yearly bills, nothing in comparison to silk gowns and spring bonnets.

The healthiest exercise for a commercial man is riding, when it is possible. It diverts the thoughts, especially if the nag be skittish, prevents the stagnation of the abdominal blood-vessels, and promotes a due flow of bile. But the outside of an omnibus is better than nothing at all, and is within the means of every one. Much walking is usually found too fatiguing, and if adopted as a duty, is apt to be monotonous. Boating and cricket are suitable for the younger members of the commercial world, but they occupy more time than can often be spared, and have to be kept for holidays. The more violent athletic sports are open to still more objection, and if it is attempted to pursue them at the same time that the thoughts are occupied in business, they exhaust the vital powers, and weakness is the result.

CHAPTER IV.

LITERARY AND PROFESSIONAL LIFE.

That dogmatic expression of Büchner's, 'No thinking without phosphorus,'[1] has gained an unhappy notoriety. Strictly taken it is a groundless assumption, for it is impossible for us to have any evidence that intellectual being may not exist joined to any form of matter, or quite independent of matter at all. We certainly do not know enough of the subject to lay down a negative statement. And if it be held to mean that the amount of phosphorus passing through the nervous system bears a proportion to the intensity of thought, it is simply a mis-statement. A captive lion, tiger, or leopard, or hare, who can have wonderfully little to think about, assimilates and parts with a greater quantity of phosphorus than a professor of chemistry working hard in his laboratory; while a beaver, who always seems to be contriving something, excretes so little phosphorus, at least in his urine, that chemical analysis cannot detect it.[2] All that the physiologist is justified in stating is that for the mind to energise in a living body, that body must be kept living up to a certain standard, and that for this continuous renewal of life a supply of phosphatic salts is required. The same may be said with equal justice of water, fat, nitrogen, chloride of sodium, oxygen, &c. The phosphates are wanted indeed, but wanted by pinches, whilst water must be pouring in by pailfuls. One might go on

[1] *Ohne Phosphor kein Gedanke*, Kraft und Stoff, sect. 122.

[2] See the analyses of the several kinds of urine in Simon's *Chemistry*, vol. ii. pp. 144, 342, and 350.

thinking for weeks without phosphates, but without water a few days, and without oxygen a few minutes, would terminate the train of self-consciousness. The practical points taught us by physiology are that for the integrity of thought the integrity of the nervous system is requisite; and for the integrity of the nervous system a due quantity of such food as contains digestible phosphatic salts.

For the intellectual direction of the nervous system it is at the same time essential that it should not be oppressed by physical and mechanical difficulties. The presence in the stomach or blood of imperfectly assimilated nutriment impedes its functions in close proportion to their amount; so that not only the chemical constituents but the mode of administering food must come into the calculation.

The most perfect regimen for the healthy exercise of thought is such as would be advised for a growing boy, frequent small supplies of easily soluble mixed food, so as to supply the greatest quantity of nutriment without overloading the stomach or running the risk of generating morbid half-assimilated products.

The physiology of the action of alcohol has a very practical bearing on the physical regimen of the mental functions. Alcohol has the power of curbing, arresting, and suspending all the phenomena connected with the nervous system. We feel its influence on our thoughts as soon as on any other part of the man. Sometimes it brings them more completely under our command, controls and steadies them; sometimes it confuses or disconnects them; then breaks off our power and the action of the senses altogether. The first effect is desirable, the others to be avoided. When a man has tired himself with intellectual exertion, a moderate quantity of alcohol taken with food acts as an anæsthetic, stays the wear of the system which is going on, and allows the nervous force to be diverted to the due digestion of the meal. But it must be followed by rest from mental labour, and is in fact a part of the same regimen which enforces rest—it is an artificial rest. To continue to

labour and at the same time to take the anæsthetic is an inconsistency. It merely blunts the painful feeling of weariness, and prevents it from acting as a warning. I very much doubt the quickening or brightening of the wits which bacchanalian poets have conventionally attributed to alcohol. An abstainer in a party of even moderate topers finds their jokes dull and their anecdotes pointless, and his principal amusement consists in his observation of their curious bluntness to the absurdity of their merriment.

There is no more fatal habit to a literary man than that of using alcohol as a stimulant between meals. The vital powers go on getting worn out more and more without their cry for help being perceived, and in the end break down suddenly and often irrevocably. The temptation is greater perhaps to a literary man than to any other in the same social position, especially if he has been induced by avarice or ambition to work wastefully against time; and if he cannot resist it he had better abjure the use of alcohol altogether.

As to quantity, the appetite for solid food is the best guide. If a better dinner or supper is eaten for a certain amount of fermented liquor accompanying it, that is the amount most suitable. If a worse, then it may be concluded that an excess is committed, however small the cup may be.

Although nothing can take the place of alcohol in this article of diet, yet fermented drinks are not suited to the nervous system at all in proportion to their alcoholic contents. The fruity ethers and aromas evolved in the process of fermentation, and which do not seem capable of existing in a digestible form without alcohol, are even more powerful in repairing the waste of the nerve power. Burgundy has acquired a special fame as food for the brain, and claret runs it hard, while good, sound, unadulterated beer is a homely creature little inferior to them. All of these are superior to sherry and port, and to spirits, for reasons given in a former chapter of this volume on the choice of food.

Mental activity certainly renders the brain less capable of

bearing an amount of alcohol which in seasons of rest and relaxation does not injuriously affect it. When any extraordinary toil is temporarily imposed, extreme temperance or even total abstinence should be the rule. Much to the point is the experience of Byron's Sardanapalus :—

> 'The goblet I reserve for hours of ease,
> I war on water.'

The posture of the body usually adopted by literary and many professional persons engaged in writing is a matter worth consideration. Chamber counsel are notoriously subject to piles and venous congestion of the rectum; women who sit much with their work in front of them get also congestion and irregularity of the uterine organs; cold feet from sluggish arterial circulation are frequently complained of by otherwise hearty sedentary workers. The ill health which these symptoms indicate may often be prevented by the use of a high desk at which the work may be done standing for a time now and then; and a further change of posture may be obtained by an easy chair which will allow of thinking with the body thrown back and by occasional walks about the room.

Athletic sports are scarcely consistent with steady, hard brain work. Probably only the most muscular try to persist in them, and they acknowledge that their intellects are readiest and strongest when they are taking quite moderate exercise, and not when their muscles are corky and their limbs light. There is a peculiar state of health into which those are apt to fall who, having for a long period kept themselves in training for boat-racing or other muscular exertion, afterwards adopt a life which involves mental labour and responsibility, even though they get a fair amount of bodily relaxation. The leading symptoms are emaciation, weariness, depression of spirits, and an unnaturally high specific gravity in the urine, which is, however, abundant and full-coloured, thus showing an excess of destructive assimilation which cannot but be very injurious.

Fresh air and relaxation of mind are of more importance than exercise, which last is indeed mainly valuable as securing them. The limits of weariness should not be transgressed. The attempt to compensate for excessive literary toil by excessive bodily toil is based on a false conception of the relations of matter and spirit, worthier of an ancient Gnostic than of a modern philosopher, which has more than once led to fatal results. I had for some years as a patient a literary lady who wrote much and well in magazines. She would go straight from her study to her garden and glebe, dig furiously and mow with a scythe, despising or rather luxuriating in fatigue. Gradually paralysis came on, showing itself first as 'writer's cramp,' and then creeping over the whole body. The mind and senses were as perfect as ever, and so long as she was able to move the tongue she dictated lively monthly articles, and at last died apparently of sorrow at being unable to communicate her thoughts.

Tobacco should not be indulged in during working hours. Whatever physiological effect it has is sedative, and so obstructs mental operations. But as a relaxation afterwards it is in moderation beneficial. As a calmative before retiring to rest it has the sanction of a vigorous brain labourer, John Milton, whose supper, we are told, consisted of bread, water, olives, and a pipe of tobacco. There is a flavour about the fare of the happy days he had passed with an elegant literary circle in Italy.

The daily habits of Robert Southey, a man who more than any other made literature a healthy profession and a successful profession, are thus described by his son in his 'Life,' vol. iii. 2 and vi. 6:—'Breakfast was at nine, after a little reading, dinner at four, tea at six, supper at half-past nine, and the intervals filled up with reading or writing; except that he regularly walked between two and four, and took a short sleep before tea, the outline of his day when he was in full work will have been given. After supper, when the business of the day seemed to be over, though he generally

took a book, he remained with his family, and was open to enter into conversation, to amuse and to be amused.'

'My actions,' he writes about this time to a friend, 'are as regular as those of St. Dunstan's quarter-boys. Three pages of history after breakfast (equivalent to five in small quarto printing); then to transcribe and copy for the press, or to make my selections and biographies, or what else suits my humour, till dinner time; from dinner till tea I read, write letters, see the newspaper, and very often indulge in a siesta;—for sleep agrees with me, and I have a good substantial theory to prove that it must; for if a man who walks much requires to sit down and rest himself, so does the brain, if it be the part most worked, require its repose. Well, after tea I go to poetry, and correct and re-write and copy till I am tired, and then turn to anything else till supper; and this is my life—which, if it be not a merry one, is yet as happy as heart could wish.'

And a very rational mode of living it was, deserving of its reward. The country air and quiet among the lakes and mountains, the association with kindred and loving spirits, the old-fashioned dinner-hour excluding uncongenial society, the regular exercise, and the sound night's rest, with temperance, soberness, and chastity, preserved his mental powers fresh and vigorous in old age, to leave to future generations undying memorials of sympathy with all that is best in humanity.

Milton describes himself as 'with useful and generous labours preserving the body's health and hardiness, to render lightsome, clear, and not lumpish obedience to the mind, to the cause of religion and our country's liberty, when it shall require firm hearts in sound bodies to stand and cover their stations.'

His blindness probably interfered with the activity of his muscular discipline in later years, for he was a martyr to gout towards the end of his life.

Samuel Johnson is another type of the literary man pure

and simple. Scrofulous, awkward, hypochondriacal, and corpulent, he was averse naturally to bodily exertion, yet he walked a good deal, and worked steadily and patiently without bursts of industry or idleness. Passionately fond of company and of eating and drinking, he restrained himself, and indulged only when the labour of the day was over. His knowledge of physiology and medicine kept him from quackery, and his medical advisers were the most rational physicians of the day. After middle life, his own observation of his health led him to abstain entirely from wine; I have heard my grandmother describe the air of dignified patience with which he passed the bottle which she often pressed upon him at her father's table. He sat up late at night indeed, yet that was not for work, but to rest the mind with sportive and varied conversation. He had his reward in the retention of his mind, even when its material organ had broken down.

Shelley was a vegetarian, and, perhaps, his peculiar way of living, combined with the fact of not writing for a livelihood or to please others, estranged his sympathies from human kind. But at all events, his temperance did not weaken his exuberance of thought and diction. What would have happened had he consumed more phosphorus, it is impossible to say; but he could hardly have been a more rapid composer or stronger wielder of words.

Walter Scott passed a genial sociable existence, took much exercise, dissuaded his younger friends from substituting gig-driving for riding, and always insisted on having seven or eight hours of utter unconsciousness in bed. Had he passed his whole life in his study, he would have written probably worse and certainly less, for he would have had a shorter life to write in.

It is true that Byron assumes in his poetry the character of a *débauché*, and says he wrote 'Don Juan' under the inspiration of gin and water. But much of that sort of talk is merely for stage effect, and we see how industrious he was, and read of his training vigorously to reduce corpulence, and

of his being such an exceptionally experienced swimmer as to rival Leander in crossing the Hellespont.

It is especially when the mind of genius is overshadowed by the dark cloud of threatened insanity, of hypochondriasis, or of hysteria, that a rational regimen preserves it to the glory of God and the advantage of man. Nothing but daily exercise, temperate meals, and a punctual observance of regular hours of study and rest, could have kept burning the flickering candle of reason in poor suicidal Cowper. Most rarely and faintly do his writings exhibit a trace of the gloom which made life to him, as he described it in his last words, 'unutterable misery.'

On the other hand, the keen poison of his own genius slew in youth Kirke White, when he surrendered himself to its exclusive cultivation :—

> That eagle's fate and his were one,
> Who on the shaft that made him die
> Beheld a feather of his own,
> Wherewith he wont to soar so high.

The elegant appreciator of nature, the author of 'The Seasons' faded away from lazy and self-indulgent habits. The great all-loving soul of Burns produced so little because it was drenched in drink and idleness, not excessive indeed, but sufficient to ruin his usefulness.

Apropos of this last matter, we may give to some people the same caution which Swift administers in a letter to Pope: 'The least transgression of yours, if it be only two bits and a sup more than your stint, is a great debauch, for which you will certainly pay more than those sots who are carried dead drunk to bed.' The machinery of sensitive souls is as delicate as it is valuable, and cannot bear the rough usage which coarse customs inflict upon it. It is broken to pieces by blows which common natures laugh at. The literary man, with his highly cultivated, tightly strung sensations, is often more susceptible of the noxious and less susceptible of the beneficial results of alcohol

and other indulgences than others. His mind is easier to cloud, and there is a deeper responsibility in clouding it.

Equally when we descend into the lower regions of Parnassus, the abodes of talent and cleverness and the supply of periodical literary requirements, we find the due care of the body absolutely essential to the continued usefulness of the intellect. The first things to which one entering the profession of literature must make up his mind, are to be respectable and healthy.

What noble fragments one finds in Savage and in Poe! and how sad to know that they are fragments instead of stately structures, solely because the builders had not the wisdom to live regular lives!

CHAPTER V.

NOXIOUS TRADES.

The digestive organs are liable to suffer from the position assumed at work by certain handicraftsmen, and the discomfort hence arising leads to the adoption of an unwholesome dietary which in the end intensifies the evil.

Shoemakers contract a peculiar sort of gastralgia, partly from the pressure of the last against the epigastrium, and partly from the constriction of the abdominal viscera, especially the stomach, by leaning so far forward to work. The use of the upright bench, in which the last is held firm by a stirrup, and an erect posture always preserved, is the best remedy for the evil, and the thanks of the country are due to Mr. Sparkes Hall for his advocacy of this method of getting over a difficulty as old as the Pharaohs at least.

Against the constipation and hæmorrhoids which the same posture induces the best preservative is the free use of fresh butter, a cold tub every morning, and an occasional dandelion pill.

The discomfort which they cause in a sensitive condition of the stomach causes vegetables to be avoided by many shoemakers. They can hardly bear to take sufficient to sustain health. So long as this is the case, they should eat as many oranges and lemons as they can, or in default of them, fresh rhubarb, and try the plan proposed before of eating vegetables only at one meal and meat alone at another. A small quantity of watercresses is also a great resource.

The same observations apply with nearly equal force to tailors, but unfortunately they have not the refuge of the upright bench to fly to, and to a certain extent also to sewing-machine workers, in whose case I would suggest that a simple contrivance by which the legs of the instrument could be shortened or lengthened would enable the changes of posture necessary to health to be made.

However, it is indubitable that a great deal of the ill-health of all classes of artisans arises from the closeness of their work-rooms, and a more philanthropic deed cannot be done for a deserving class than the bringing under the notice of the district health-officers instances of the violation of the law by masters.

Gardeners often are afflicted with water-brash, arising in a measure from the stooping posture deranging the viscera which receive the food, especially the lower end of the gullet. But I think that an additional cause is frequently the bad cooking of the vegetables they eat. Half-boiled potatoes and cabbage are as injurious as ill-prepared oatmeal is found among populations which are nourished on that diet.

The poisoning to which those who work in lead are exposed by their occupation may be almost always prevented by scrupulous cleanliness in taking food. There is abundant proof that the metal enters the system through the stomach, and there is but doubtful evidence of its entering by any other path. From dirty hands it gets into the bread, from dusty clothes it besprinkles the meat and drink, and thus acts as quickly and surely as if it had been brought in by the more usual way of the drinking water. It is the most certain and noxious if by any peculiarity in the manufacture it is converted into a chloride salt, but the form which we generally meet with is the white carbonate, insoluble indeed in water, but unfortunately soluble in the fluids of the digestive canal, saturated as they are with carbonic acid. In the case of painters who employ white lead, it is quickly deprived of some of its noxiousness by mixture with oil, for in that condition it

can only get into the food from the hands. But where the finely powdered or precipitated Kremnitz lead is employed, as for example in the manufacture of polished cards, the clothes become saturated with the dust and convey it to the victuals. Not only should the hands be washed, the hair brushed, and the outer garment shifted, before meals, but the men should not be allowed to bring their food within the poison-laden atmosphere of the workshops.

Plumbers are said to inhale lead in the fumes which arise in the process of casting, and 'brass-founders' ague' also appears from the researches of Dr. Greenhow to be caused by the fumes of solder, consisting mainly of oxide of zinc, being drawn into the lungs. But it must be remembered that in both these handicrafts a great deal of dirt adheres to the skin and clothes and may thus pass into the food. I have never seen clean men affected.

Some handicrafts are noxious from the high temperature at which they are obliged to be carried on. In these cases, the frequent and free use of cold drinking water is sanctioned by experience as the best preservative of health; the copious evaporation from the skin keeping down the heat of the blood. And the most cruel enemy to health is alcohol, which induces degeneration of the liver, heart, or kidneys, or all these at once, and prevents at any rate the due exercise of the lungs' functions, even if it does not directly disorganise that tissue. My own impression is that the emphysema and black deposit so often found in the lungs of artisans exposed to great heat is in no small measure due to alcohol and to the neglect of its antagonist water.

For example, the consolidation and subsequent breaking down of the lung peculiar to dry grinders is seldom if ever found in temperate men; a healthy mucous membrane has the power of rejecting the foreign particles of metal which adhere to it when congested and degenerated.

Colliers, who labour in the dark in a confined hot atmosphere deficient in oxygen, suffer from bloodlessness and

indigestion. The bonesetters, the popular practitioners among this class, describe it as 'a little bone broke' in the stomach, pummel the abdomen and make the patient give up work and drink for a season with successful result. Philanthropic coal-owners should arrange the shifts so that a man may be put in turn on to night work and have his share of sunlight. And it is better for the men not to eat in the pits, but to make their principal meals when off work. The diet of colliers is generally too nitrogenous for a life of daily muscular labour.

Tea-tasters sometimes suffer from a special kind of nervous affection. The hand gets tremulous, there is sleeplessness, head-ache, anæmia, indigestion, with a flabby tongue covered with a smooth yellow coat. To avoid this, they should live well, and always take some food before exercising their office. Smelling the tea seems to be more injurious, and really less decisive, than sipping the infusion.

Evils consequent on other trades are not mentioned here, either because they are unconnected with diet, and not to be avoided by any special arrangement of diet, or else resolve themselves simply into temptations to intemperance.

CHAPTER VI.

ATHLETIC TRAINING.

ARE the dramatist and the novelist drawing from nature when they present us a picture of a well-born and well-bred athlete, stupid, immoral, selfish, case-hardened by his brute strength against the finer emotions of pity and honour, and blind to intellectual pleasures? If the original exists, he is happily very rare. He is certainly not conspicuous in the list of 294 rowers in University races collected by Dr. Morgan, which on the other hand is adorned with bishops, poets, public school masters, leading barristers, devoted clergymen, elegant orators, scientific chemists, philanthropists, and other ornaments of the human race.[1] Eminent muscular ability evidently is not inconsistent with a superiority to the average in other respects, and the improvement of the body does not prevent the improvement of the mind.

A charge more serious, because more troublesome to answer against athletics, is that they lay a foundation for disease in after years, and thus shorten life. Likely enough the spectators know that the dropping down dead on the stage of an athlete, apparently in the height of healthy vigour, is a gross misrepresentation of nature. But yet the scene rankles in their memories, and they can with difficulty divest themselves of the feeling that the exuberant energy of a man in training wears out the vital forces, and is repaid by weakness which will cut short the days. We may know that the impression

[1] *University Oars*, by John E. Morgan, M.D.

exists by the frequency with which the friends of patients assign athletics as the cause of all sorts of diseases without any other reason than that the failure in health was first made manifest during some bodily exertion. Of course it is during bodily exertion that the discovery is made: no one finds out that his legs are weak till he tries to walk, or that his lungs or heart are injured till his wind fails him at a pinch. But that a man previously in good health injures his constitution by training, so as to be more liable than ordinary persons to any peculiar class of disease or degeneration, is negatived by the laborious investigations of Dr. Morgan. He has followed up with personal enquiries the 294 'university oars' mentioned above, and he finds, as was to be expected, that since 1829, when his list begins, some have died, some have been killed, some have fallen into ill health, but 238 survive to describe themselves as hearty and strong. Of the deaths (39 in all) 11 were from fevers, 7 from consumption, 6 from accidents, 3 from heart disease, and lesser numbers from other special causes. Now it is heart disease which especially is attributed to athletic sports, and it is a surprise to find statistics showing that their patrons have suffered from it rather less than the rest of the population, and much less than the sailors whom we are so solicitous to keep in good health.[1] Deaths from fevers certainly cannot be considered as evidence of an injured constitution; indeed Dr. Graves of Dublin (a high authority in this matter) remarks, and the experience of most of us will bear him out, that when zymotic diseases attack strong men the risk is greater than is run by weaker frames. The end of 2 by drowning, and 3 by gun-shot wounds, show the possession of energy and unselfish courage, seldom the characteristics of a broken invalid. The cases of the 17 who do not furnish a good account of their health are mostly

[1] Mortality from heart disease in *Registrar-Gen. Reports* for 10 years, 8 per cent.; in navy (1868), 13 per cent.; among university oars, 6½ per cent.—*University Oars*, p. 28.

somewhat vague. Among so many, several must have hereditary tendencies to disease; others say their medical attendants trace no connection between their complaints and previous muscular exertion, and in such a long period as forty years innumerable evil influences must have been in action; while in some families it seems traditional always to speak of their health as only moderate, and in others to look back upon the exuberances of their youth as follies. So that 17 is in fact a small number to be occasionally falling into the hands of the physician.

The best test of the value of anything is to reduce it to Arabic numerals, and pounds, shillings, and pence, as insurance offices act by our constitutions. Dr. Morgan has applied this test to the 294 cases under consideration. According to Dr. Farr's Life Tables the expectation of life at 20, the average age of university oarsmen, is 40 years. But the survivors have still an expectation of life of 14 years before them, and this must be added on while a calculated allowance must be made for those who have died, and an estimate also deducted for the 17 lives who reckon themselves damaged. The whole calculation is too long to be gone into here, but the result is decidedly favourable; for, taking the experience as it stands, the expectation of life of each individual comes out, not 40, but 42 years. So that any insurance office which had taken them all at ordinary rates would be making a handsome profit and exhibit a good prospective balance sheet.

The conclusion is inevitable that for young men in good health very severe athletic training strengthens the constitution and lengthens life.

It will of course strike every one that our example here is taken from a specially select class of humanity. True, the fame of the University would not be entrusted to one likely to break down and disappoint his colleagues. And herein lies a great advantage possessed by boat-racing above other athletic sports, namely, that it is to the interest of all con-

cerned to exclude from the practice those who are likely to be injured by it. For that some are likely to be injured is never denied; and it probably would be wise if the crews, instead of acting solely on their own responsibility, were to insist on all who joined them having their fitness to undergo training tested by a medical man. Mr. Maclaren says he would not allow any one to pull in a college boat whose chest measured less than 36 inches, but it is evident that such an absolute rule must be fallacious, for the circumference of the chest must bear in a well-built man a proportion to the height. The better test is the vital capacity or aërial contents of the lungs, which Dr. Hutchinson's spirometer and tables enable us to measure so accurately.

Other forms of athletics have not the same safeguard. But still the good sense and good feeling of Englishmen is such, that a man very quickly finds out, or is told by his comrades, if anything renders the ambition of distinction in bodily exercise unsuitable for him. Where there is any suspicion of this being the case, parental authority may fairly be interposed, and the matter settled in a single medical examination.

It is not necessary that every one who trains should aim at being, or even wish to be, a distinguished athlete. There are modified forms or rather degrees of the same process, which cannot be trusted indeed to produce the extraordinary development of nerve force needful for successful boat-racing and the like, but which nevertheless bring the body into a state of high health very conducive to comfort and usefulness.

The reading or other intellectual pursuits during training should be very moderate and (so to speak) mechanical. Hard head-work should not be carried on at the same time as hard training. It should be gradually given up at the beginning and resumed gradually after the training has been gone through. But there is no reason why the systematic cultivation of the mind and body should not alternate to their joint

advantage, and indeed it evidently has done so in the case of many of Dr. Morgan's heroes, whose names make a conspicuous appearance in the class lists of classical and mathematical honours.[1]

The usual time allotted to training is six weeks. The objects to be attained in this period may be described as:—

1. The removal of superfluous fat and water.
2. The increase of contractile power in the muscles.
3. Increased endurance.
4. 'Wind,' that is, a power of breathing and circulating the blood steadily in spite of exertion.

The first object is aimed at by considerably adding to the daily amount of nitrogenous, and diminishing farinaceous and liquid food, and providing that it should be so consumed as to be fully digested. The second and third are secured by gradually increasing the demands made upon the muscles till they have learnt to exert at will all the powers of which they are capable, and for as long a period as the natural structure of the individual permits. Wind is improved by choosing as part of the training an exercise, such as running, which can be sustained only when the respiratory and circulating organs do their duty fairly.

The muscles of the limbs become under a regimen of this kind more 'corky' or elastic, and more prominent when 'put up' in a state of contraction. They improve in quality and efficiency, but that they become larger is extremely problematical. Hypertrophied organs are well known to lose their shape and power; an enlarged heart, instead of circulating blood better, is an encumbrance; the muscles of the hollow viscera, when augmented in thickness, do not expel their contents freely; an hypertrophied finger, instead of being stronger than the rest, is weaker; and all these are extremely liable to degenerate prematurely and lose their vitality. So that if the

[1] The 294 include, at Oxford 6 firsts and 11 seconds in classics, 1 first and 2 seconds in mathematics, at Cambridge 10 firsts and 5 seconds in classics, 8 wranglers and 21 senior optimes in mathematics.

muscles did by training grow bigger, as reckoned in a state of repose, it were a result not at all to be desired.

The skin becomes soft and smooth, and apparently more translucent, so that the red bloom of youth shines through it more brilliantly. The insensible perspiration is regular and even; while at the same time sweating is not so readily induced by bodily exertion, and it is never cold and sudden, even with mental excitement.

Superfluous fat is removed from all parts of the person, as is evinced by loss of weight. This requires to be carefully tested by the scales from time to time; for if the reduction be carried beyond a certain point, which varies in different men, a loss of power and of endurance is felt, and probably future evil results may arise. This point is technically called the 'fighting weight,' but the observation of it need not be confined to the pugilistic trade.

Training increases wonderfully the vital capacity of the chest, so that a much greater quantity of air can be blown in and out of the lungs and with greater force than previously. And this vital capacity endures longer than any other of the improvements, for I have found in examination for insurance several clients, formerly in training, but who had laid aside violent exercise for some years, still retaining that mark of vigour to a considerable extent above the average. It is evidence of the permanent elasticity of the pulmonary tissue, an efficient protection against asthma, emphysema, and other degenerations of the organ of breathing.

Indigestion, acidity of stomach, sleeplessness, weariness of life, nervous indecision, dyspeptic palpitations, and irregularity of the bowels disappear under training. But if they exist, the regimen should be entered upon with more than usual caution and under medical advice.

The following were the systems pursued at the Universities in 1866 as given by Mr. Maclaren in the Appendix to his 'Training in Theory and Practice,' and I believe still carried on for boating-men.

THE OXFORD SYSTEM.

Summer Races.

A Day's Training.

Rise about 7 A.M. .		So as to be in chapel, but early rising not compulsory.
Exercise . . .	A short walk or run .	Not compulsory.
Breakfast, 8.30 .	Meat, beef or mutton .	Underdone.
	Bread, or toast dry .	The crust only recommended.
	Tea	As little as possible recommended.
Exercise (forenoon) .	None	
Dinner, 2 P.M. . .	Meat, much the same as for breakfast . .	
	Bread	Crust only recommended.
	Vegetables (none allowed) . . .	A rule, however, not always adhered to.
	Beer, 1 pint	
Exercise . . .	About 5 o'clock, start for the river, and row twice over the course,[1] 'the speed increasing with the strength of the crew'	
Supper, 8.30 or 9 .	Meat, cold	
	Bread; perhaps a jelly or watercresses	
	Beer, 1 pint	
Bed about 10		

Summary.

Sleep	About nine hours.
Exercise	Walking and rowing about one hour.
Diet	Very limited.

[1] The length of the course is nearly a mile and one-eighth.

Winter Races.

A Day's Training.

Rise about 7.30 A.M.		Early rising not compulsory.
Exercise . . .		Not compulsory.
Breakfast, 9 . .	As for summer races .	
Exercise (forenoon) .	None	
Luncheon about 1 P.M.	Bread or a sandwich .	
	Beer, half a pint . .	
Exercise . . .	About 2 o'clock start for the river, and row twice over the course	Crews are taken over the long course to Nuneham, perhaps twice during their practice.
Dinner at 5, in Hall .	Meat as for summer races . . .	
	Bread	
	Vegetables as for summer races . .	
	Pudding (rice), a jelly .	
	Beer, half a pint . .	
Bed 10.30 . .		

N.B.—It is particularly impressed on men in training that as little liquid as possible is to be drunk, water being strictly forbidden.

Summary.

Sleep . . } Exercise . . }	As for summer races.
Diet . .	Nearly the same as for summer races; luncheon being about equivalent to supper.

THE CAMBRIDGE SYSTEM.

Summer Races.

A Day's Training.

Rise at 7 A.M.		
Exercise . . .	Run 100 or 200 yards 'as fast as possible'.	'The old system of running a mile or so before breakfast is fast going out, except in the case of men who want to get a good deal of flesh off.
Breakfast, 8.30 .	Meat, beef or mutton . Toast dry. Tea, two cups, or towards the end of training a cup and a half only. Watercresses occasionally.	Underdone.
Exercise (forenoon) .	None.	
Dinner about 2 P.M. .	Meat, beef or mutton. Bread. Vegetables, potatoes, greens . . . Beer, 1 pint. *Dessert.*—Oranges or biscuits, or figs; wine two glasses.	Some colleges have baked apples, or jellies, or rice-puddings.
Exercise . . .	About 5.30 start for the river, and row to the starting-post and back.	
Supper about 8.30 or 9	Meat, cold. Bread. Vegetables—lettuce or watercresses. Beer, 1 pint.	
Bed at 10.		

Summary.

Sleep	Nine hours.
Exercise	About an hour and a quarter.[1]
Diet	Limited.

N.B.—On Sundays men generally take a long walk of five or six miles.

[1] The course is a trifle longer than at Oxford, and there is a pull of 1¼ mile to get to it.

Winter Races.

A Day's Training.

Rise about 7 A.M.	
Exercise . . .	As for summer races.
Breakfast, 8.30 . .	„ „
Exercise (forenoon) .	None.
Luncheon about 1 P.M. .	A little cold meat. Bread. Beer, half a pint, or biscuit with a glass of sherry; perhaps the yolk of an egg in the sherry.
Exercise . . .	About 2 o'clock start for the river and row over the course and back.
Dinner about 5 or 6 .	As for summer races.
Bed about 10.	

Summary.

Sleep . . Exercise . .	Same as for summer races.
Diet . .	Nearly the same as for summer races, luncheon being about equal to supper.

There is nothing very terrible in the discipline here enforced, while some latitude is permitted to peculiarities and a wish for variety, and plenty of time is left for business and social intercourse. Other plans are objectionable from involving, without any resulting advantage that I can see, a complete *bouleversement* of the usual times and seasons adopted by the upper and middle classes in this country. For example, in Clasper's method dinner is to be at 12 o'clock, with nothing more than a very light tea afterwards and no supper. Then a country walk of four or five miles is to be taken before breakfast, and a couple of hours' row after, and another hard row between dinner and tea.[1] 'Stonehenge' again requires the time between breakfast and dinner to be spent entirely in billiards, skittles, quoits, rowing, and running, in spite of

[1] Quoted by Mr. Maclaren from *Rowing Almanac* for 1863.

another hour's row being prescribed at 6 P.M. He also requires the aspirant to athletic honours to sleep between ten and eleven hours.[1] Only professionals are likely to carry out such rules. The most doubtful point which a physiological critic would lay his finger upon is the exaggerated abstinence from fluids recommended in the Oxford scale. The use of water to the extent of the thirst felt by the individual promotes the vital renewal of the skin, kidneys, and digestive viscera, and cannot be injurious. But it should not be very cold, or swallowed in great quantities at once on a full stomach, or after extraordinary exertion, lest it should lower too much the bodily temperature. If the mouth be first rinsed out, and the draught imbibed calmly and deliberately, it quenches thirst much better than when rudely gulped, and is not likely to be taken in excess.

It is probably not necessary in the present day to enforce sufficient tubbing to keep the skin clean and fresh. It is in fact more necessary to deprecate excess in the use of cold water. If a bath is taken between exercise and a meal, the chill should at least be taken off, for there has been a considerable loss of temperature by perspiration, and more cannot be afforded. The use of a cold bath is to contract the cutaneous arteries, and by throwing the blood back suddenly on the heart and lungs to stimulate them to increased reaction, so that the living stream should flow vigorously to the extremities. If the skin is already pale and cool, as after exertion, it shows that they are already contracted and rather demand relaxation. The time for a cold bath is when the skin is full-coloured, dry, and warm.

Nothing is said here of the training of jockeys and others whose object is to reduce their weight to its extreme minimum irrespectively of augmenting the strength, as that cannot be recommended on the score of attaining high health, nor is it likely to be voluntarily undertaken by healthy persons.

The university scheme may fairly be accepted as a typical

[1] Article 'Boat-racing' in *British Rural Sports*, 1861.

regimen for fully developing a young man's corporeal powers to fulfil the demands of an extraordinary exertion. It is a standard which we may modify according to the circumstances for which the training is required.

Thus, for instance, in training for the moors or for the thorough enjoyment of partridge shooting, the reduction of fat should not be carried so far, as steady endurance for many days together is required, and a treasure of adipose tissue as a basis of molecular growth must be retained. Butter may be allowed, milk in the tea, and eggs as a change for the lean meat at breakfast. For men who have got into middle life running is needlessly troublesome, and quick walking may be substituted both for that and for the rapid rowing. Nevertheless the times should be observed strictly, and the amount of the walking may be raised gradually up to that wanted for the day's sport. It will be necessary, however, to allot to exercise a considerable longer time than is allotted in the college training scheme. For it must be remembered that quick rowing for an hour is a violent exertion and takes more out of a man, and practises the wind better than four hours' walking. The chest may be expanded by the employment of light dumb-bells or clubs (if heavy they strain the muscles). And the healthy action of the skin should be promoted by friction with rough towels and horse-hair gloves. The time of the training should not be so long as six weeks, for in point of fact it is carried on by the exercise of the sport, and if such an extended period as used for boat-racing is adopted, there is a risk of over-doing the discipline. A fortnight is quite enough for the purpose.

To those of our countrymen and women who have not the opportunity or inclination for spending their holiday in what is commonly called 'sport,' the fashion of mountaineering is a great boon. And even sportsmen, during the dead season when there is nothing to be killed, experience a compensation in finding something to go up. But a great deal of the advantage of the relaxation is often lost by not being already

in training. At least the first week is wasted in getting into condition, and is a period of as much pain as pleasure. This may be obviated by a gradual adoption of the diet and discipline, modified as above, for a week or ten days before starting.

The pain in the back and sides which hunting men often experience at the commencement of the season, arises usually from imperfect expansion of the lungs in ordinary breathing. The muscles of the trunk are strained by the effort of expiration during exercise. The inconvenience may be prevented by a partial training. The diet should be drier than usual, and all sweets and pastry left off, the chest expanded by dumb-bells and running, and the habit acquired of keeping the lungs as full of air as possible. Women, being weaker-muscled than men, often feel this to the extent of giving up altogether the healthy amusement of riding. The simple adoption of modified training gets over the difficulty. The dumb-bells should be used in private before putting on the stays, and particular attention paid to the injunction of thoroughly inflating the lungs.

It used to be the custom before the commencement of a course of training to be bled, purged, and sweated. I do not think it of any service, and it induces constipation of the bowels, besides being weakening. Some take Turkish baths during athletic training, but they appear to derange the daily discipline, unless they are taken every day, which would be a decided excess.

Ladies who are going to try training for athletic purposes, will find some attention to costume expedient. If stays are worn (and there is no objection to them if well-fitted and not too tight) they should have no shoulder-straps. The drawers should not be tied below the knee. The best defences to the lower extremities in rough ground are stout Alpine shoes, and light leathern gaiters half way up to the knee supporting the long socks without garters. A light woollen jersey should be worn next the skin. The skirt of the dress should be short

and narrow, and the best materials are serge and homespun. Besides these the less drapery is worn the better.

Training is sometimes carried too far—the men describe themselves as 'fallen to pieces.' The most peculiar symptom is an occasional attack of sudden loss of power, after exertion. It is sometimes called 'fainting,' but there is no loss of sense, as in that state, and is quickly relieved by liquid food. It is pathologically an acute and temporary form of that consequence of overstrained muscle which constitutes 'writer's,' 'turner's,' and 'blacksmith's' palsy. The obvious remedy is to leave off training.

The exercise and excitement combined of practising for boat-racing will sometimes induce recurrent palpitations of the heart. A physician should immediately be consulted as to whether this arises from an organic cause; if it does not, rest and a dose or two of purgative medicine should be taken before a resumption of training; and it will be well to add a moderate quantity of port wine to the dietary. If the palpitations still return, there is no help for it but to give in, and acknowledge that nature has not cut out everyone to the pattern of an athlete.

The unusual strain on the skin sometimes induces boils. The best preventive is to anoint the skin with a little sweet oil after the morning bath. If a spot gets tender and red, threatening a boil, touch it lightly every day with nitrate of silver, and give bark and chlorate of potash twice a day in the usual doses. (*Decoct. Cinch.* fl. ℥ j.; *Pot. Chlor.* gr. xv.)

A modification of training of considerable importance to notice is that which contemplates the reduction of superfluous plumpness, either for the sake of the appearance or the general comfort of the sufferer. There may be a question whether the health is benefited by it, unless the previous diet or habits had been irrational and improper.

Corpulence usually prevents exercise being taken to a sufficient extent for confidence to be placed in it as an efficient part of the treatment, and therefore the diet becomes a more

essential feature. If an exhausting amount of bodily exertion be persisted in, the digestion of meat is interfered with, while at the same time the absorption of such fat as unavoidably exists in the food still goes on, so that the muscles and nerves lose strength while the adipose tissue grows. Besides this, if by violent means the weight is worked down, those violent means must be continuously sustained to keep it down; and if they are neglected in consequence of more absorbing occupations, the inconvenience rapidly increases to a greater degree than ever. Many uncomfortably stout persons are very active in mind and body, and really could not add to their muscular discipline without risk of injury.

The following may be taken as a modification of the training regimen suitable for the reduction of corpulence.

Day's regimen for a three weeks' course.

Rise at 7. Rub the body well with horse-hair gloves, have a cold bath, take a short turn in the open air. Breakfast (alone) at 8 or 8.30, on the lean of beef or mutton, cutting off the fat and skin, dry toast, or biscuit, or oat-cake, a tumbler of claret and water or tea without milk or sugar, or made in the Russian way with a slice of lemon. Luncheon at 1 on bread or biscuit, Dutch cheese, salad, watercresses, or roasted apples (without sugar or cream), hung beef, or anchovies, or red herring or olives, and such-like relishes. Drink, after eating, claret and water, or unsweetened lemonade, or plain water, in moderation. Dinner at any convenient hour. Take no soup, fish, or pastry, but plain meat, of any kind except pork, rejecting the fat and skin. Spinach, French beans, or any other green vegetable may be taken, but no potatoes, made dishes, or pastry. A jelly or a lemon-water ice or a roast apple must suffice for sweets and dessert. Claret and water at dinner, and one glass of sherry or Madeira afterwards.

Between each meal exercise, as a rule, in the open air, to

the extent of inducing perspiration, must be taken. Running, when practicable, is the best form in which to take it.

The number of hours allotted to bed in the University schemes is too much for the purpose now proposed. Seven is quite enough, and if the person under training wants to retire before 12 o'clock, he ought to be astir before the time mentioned above. There are few things more weakening than remaining in bed, or even in a bedroom which has been closed during the night, when thoroughly woke up. During sleep little air is required; we all know the slow shallow breathing of a sleeper, by which the respiratory muscles are rested. Beasts get enough oxygen in their narrow dens, and man in his fusty garret. But once awake, both expand their lungs fully, instinctively demand fresh air, and suffer from the want of it more at that hour than at any other time during the day. If a Sybarite must indulge in the horizontal position, let him at all events open his window and take his tub before he does so.

If good Turkish baths are accessible, four or five may be used in place of exercise between meals at intervals during the reductive training. And thorough shampooing by an experienced hand should not be omitted.

The weight is to be accurately recorded at the commencement and every four days, so that its loss may not be too rapid or excessive. Six or seven pounds is usually as much as it is prudent to lose during the fortnight.

A more important sign of improvement is increased vital capacity of the lungs as measured by the spirometer.

After the fortnight's course the severe parts of the discipline may be gradually omitted, but it is strongly recommended to modify the general habits in accordance with the principle of taking as small a quantity as possible of fat and sugar and of the substances which form fat and sugar, and sustaining the respiratory function. Fat meat, rich milk, butter, malt liquors, pastry, starchy foods (such as potatoes, puddings),

sweet vegetables (such as parsnips and beet-root), sweet wines (such as champagne) should be taken only most sparingly. An appetite should be acquired for lean meat, especially for beef, mutton, and venison, for game and poultry, for plain boiled fish, for poor new cheese, for green vegetables and salads, summer fruits, oranges, lemons and pomegranates, almonds (fried and sprinkled with salt and cayenne), roast apples, olives, lemonade, buttermilk, claret, and hock. Aerated bread, captain's biscuits, and dried toast, all in moderation, are the most appropriate form of flour.

Excessive stoutness amounts to a disease; it is a true hypertrophy of the adipose tissue, and it is not capable of removal by the means mentioned above, though in cases where it has been augmented by a previously inconsiderate diet, it may be considerably reduced. The subject will be resumed when the dietetics of disease are under consideration.

CHAPTER VII.

HINTS FOR HEALTHY TRAVELLERS.

A MODERATE course of training is a good preparation previous to travelling for business or pleasure, or for active military service; but it is well in these cases not to let the dietary become habitually too limited or careful. It is convenient to be able to eat without repugnance any food capable of supplying nutriment, even though dirty, ill-cooked, or of strange nature. There is often a choice only between that and going without.

When actually on a carriage or railway journey it is unwise to make large meals. They are sure to be swallowed in a hurried manner, and in a state of heat and excitement very unfavourable to digestion. The best way is to make no meal at all till the journey is over, but to carry a supply of cold provisions, bread, eggs, chickens, game, sandwiches, Cornish pasties, almonds, oranges, captain's biscuits, water, and sound red wine, or cold tea, sufficient to stay the appetites of the party, and let a small quantity be taken every two or three hours.

If this plan be adopted, not only is activity of mind and body preserved, but that heat and swelling of the legs which so often concludes a long day's journey is avoided. Attention to the matter is particularly necessary when the journey continues all night, and for several days in succession, since varicose veins and permanent thickening of the ankles have

sometimes resulted from this exertion being combined with too long fasts and hurried repletion at protracted intervals.

The less stimulant a traveller consumes before he arrives at his sleeping place the better. Then the habitual allowance is of advantage. If a good wine is made in the country he is passing through, he will probably prefer to fare the same as his hosts; if not, Bordeaux and Burgundy are the best vintages when procurable, and Marsala in Italy.

In France and Germany very good local beer is to be obtained, but landlords seem to object to its being publicly used as a beverage. We ought to insist on our rights as tourists on this point. In apple districts, cider is usually placed on the table gratis, and makes a good substitute for doubtful water.

The water is very apt to disagree with tourists, especially in volcanic, basaltic, mountainous, and marshy districts. A pocket filter is a great protection, and boiling the water makes all organic matters harmless and gets rid of the greater part of the lime. But neither of these expedients removes the neutral and alkaline salts, which will sometimes act as a purgative.

In almost all country places out of England it is impossible to avoid the greasy dishes which are apparently preferred by all except our own countrymen. And a frequent consequence is rancid indigestion, with nauseous taste in the mouth, and flatulence or diarrhœa. A few drops of vinegar or lemon juice, and a little cayenne pepper in the plate are the readiest correctives.

Another article of cuisine that offends the bowels, if not the palate, of Britons, is garlic. Not uncommonly in southern climes an egg with the shell on is the only procurable animal food without garlic in it. Flatulence and looseness are the frequent results. Bouilli, with its accompaniments of mustard sauce and water melon, is the safest resource, and not an unpleasant one, after a little education.

By special favour potatoes can usually be obtained boiled

with their jackets on (*en chemise*), but unless asked for are seldom produced.

Raw ham, which some persons seem to find a luxury, will be avoided by all sane travellers who have heard of the frequency with which it is infested with live measle-worm and trichina spiralis.

It is a great convenience to be able to eat olive oil, which is much wholesomer than doubtful butter in warm climates; and those who care for the future comfort of their sons and daughters will accustom them to the taste in youth, instead of encouraging a daintiness in this particular, as I have seen done. Repugnance to the flavour of goat's milk ought to be got over by those who ever intend to frequent lands where the pasture will not support cows. A preference also for boiled milk, or milk that has been boiled, is a safe fancy to indulge, where you are not acquainted with the yielder of the liquid, especially when typhoid fever is rife. Irish peasants scarcely ever drink it raw.

On the Continent the household bread is usually unwholesome and nasty, and captain's biscuits are never to be obtained. It is prudent to carry a store of them for use whenever the staff of life is especially abominable. This does not apply to Spain, where delicious white, firm, fine-grained bread can be procured in places where it is the only thing eatable by a dainty person.

A small tin of the usual tea employed at home is well worth the space it occupies.

'Liebig' is procurable in almost every civilised town, and a small store may be laid in when rough cookery is expected.

A knowledge of simple methods of preparing food is often a great comfort to a traveller. A friend of mine was once considerably non-plussed in Norway, after he had bargained for some lamb, by having the animal handed over to him bleating, with a request that he would return the skin in the evening. The task was accomplished under difficulties, but the details are unpleasant. This is an extreme contingency,

which need not be provided against by all vacation barristers acquiring the art of butchering; but still it is worth while to learn in your own kitchen how to prepare an omelet, fry fish, eggs and ham, cut and grill a steak off a joint, boil and fry potatoes, scrabble eggs, mull wine (if it happens to be sour), boil coffee, make 'Liebig' into good soup, &c. These accomplishments may be brought into play without wandering very far from home; and it is astonishing how popular they render those sometimes troublesome fellow-travellers, the ladies of the party.

Travellers, otherwise strong, are apt to get diarrhœa occasionally, partly from the unaccustomed diet, partly from the water, but very frequently also from the pestiferous state of the provisions for daily retirement in Continental inns. It is worth knowing that in many places, especially in France, the landlady has a small private establishment of her own, quite unobjectionable, of which she will lend the key to favoured guests, especially Britons. In country places gentlemen will do well to worship Cloacina *sub Jove*. For this sort of mild dysentery will keep recurring again and again, easier induced by having occurred before; and not unfrequently it will leave traces of imperfect digestion in the bowels for weeks after returning home.

As a provision against accidental diarrhœa it is wise to be prepared with some chalk and opium powders (*Pulvis Cretæ aromaticus cum Opio. Pharm. Brit.*) made up in 20-grain packets, in thin gutta percha or oil silk, to keep them dry. In northerly latitudes half a packet, containing $\frac{1}{4}$ gr. of opium, can be taken after each relaxation. But in warm countries a more efficient, at least a more permanently efficient remedy is to be found in lemon juice. The patient should lie down flat, and keep sipping a mixture of half and half lemon juice and water, or simply sucking lemons, till the symptoms have ceased, which will soon be the case. The nausea and narcotism induced by opium are thus avoided, and there is no danger in taking an excess of the fruit. It is a good thing

to get accustomed to the acidity of the flavour, for there is nothing so wholesome and convenient as a drink.

Travellers in countries where the atmosphere is very dry, as in the vicinity of the Mediterranean, sometimes lose their appetite for breakfast from want of sleep. This inconvenience may be overcome by soaking a sheet or some towels in water and spreading them out on the floor of the bed-room, so as to diffuse moisture through the air breathed during sleep.

Long days' rides, especially in the heat, are liable to bring on an inert or semi-paralysed condition of the stomach, so that if a full meal be taken immediately it remains undigested, and is frequently thrown up again. This may be prevented by a rest and a hot bath between getting out of the saddle and sitting down to table. If these cannot be had, it will be best to eat something very light, such as soup, eggs, bread, and in small quantities, and to make up the deficiency next day at breakfast and luncheon, which should be always the solidest meals in journeys of this sort.

Boils are sometimes very troublesome to equestrians. A small piece of nitrate of silver ought to be carried in the baggage, and on the first tenderness, redness, and hardness of the skin, the part should be damped and the caustic crossed twice over it. The object is not to make the cuticle rise in a blister, but to contract and render insensitive the cutis. This will usually cause the boil to die away.

Pedestrians will do well to make a good breakfast before starting, however early the hour may be. If tea or coffee are not relished on account of the time being so unusual, beef tea or soup will be found an excellent substitute. If prepared over night, they are easily warmed up in the morning.

Advantage should be seized of every day of rest to feed well, and fatten up as much as possible. This does not put the body out of training, but in fact keeps it in a condition fit for continuous exertion.

Beer, wine, and spirits should be avoided altogether during the day's work, but water, cold tea, or lemonade may be

drunk according to thirst. An occasional pipe of tobacco seems to palliate better than anything else that dryness of mouth which constitutes false thirst. This false thirst naturally arises during exercise in a rarefied air, but in mountainous places it is often aggravated very much by eating snow or ice. Spring water, though scarcely over the freezing point, does not seem to have the same unpleasant effect.

Sea-voyages have a powerful curative effect on some invalids, but they do not generally bring healthy persons into very good condition. If it is calm, landsmen over-eat themselves, take too little exercise, sleep badly and get their bowels constipated. If it is rough, they suffer from sea-sickness and the increased badness of ventilation below. The remedies for these things, so far as they are remediable, are obvious.

Short sea-voyages do nobody any good, and a few people a great deal of harm. They are an inevitable evil for all islanders who wish to enlarge their ideas. Sea-sickness may, however, be considerably palliated by rational preparation for it. In the first place care should be taken to finish all preliminary arrangements as long before starting as you can, so that a day or two may be given to rest and a temperance somewhat more than usual. If the eyes or skin are dingy and yellow, take a purge of aloes or taraxacum. Go on board in good time, so as to secure a comfortable post. If it is evidently going to be rough, go below and lie down immediately. If you remain on deck, be very warmly clothed, and especially let no chill affect the abdomen or back. If the stomach feels empty, and still more if any dry retching occurs, take bottled porter and biscuit spread with a little butter and cayenne pepper—which last article, by the way, amply repays the space it will occupy in a traveller's pocket throughout a journey, so useful is it on all occasions. Nutritious food should be taken when practicable, but loading the stomach with trash brings on sickness; though truly enough it facilitates the process of vomiting, and prevents the regurgi-

tation of bile, which is always peculiarly painful after dry retching.

If the voyage is by night, and sufficiently long to make a night's rest of, say seven or eight hours at least, it is worth while to swallow a full dose of chloral on embarking, and to sleep through one's troubles. But if you have to wake up in two or three hours to disembark, you feel ill all the next day, if not longer.

Ice-bags, and all other charms for sea-sickness, have turned out mere trade puffs.

CHAPTER VIII.

EFFECTS OF CLIMATE.

The race of man exhibits great powers of resistance to external influences, and is able to occupy a length and breadth of the earth's surface such as is attained by no other animal or even plant. This arises not from any innate bodily strength, but from his being able to accommodate himself by the aid of reason to circumstances. Thus experience has led to the adoption of very different dietaries in different regions. An Esquimaux would find much difficulty in growing rice near his home, so he wisely dines on such meat as he can get or on whale-blubber. A Bengalee could not obtain a supply of flesh food without immense labour, and finds rice grown easily, so he lives almost entirely on the latter. The curiosities of food afford examples of the boldness of man in not being deterred by their repulsiveness to his senses from converting assimilable substances to his use, enough to make the simple reader shudder; but I do not know that the philosopher gains much knowledge from such recitals. Man learns to swallow, *bon gré, mal gré*, whatever contains aliment, and the art of living lies in the learning so to eat it as that it shall serve his turn. Climate influences diet mainly by the supply it affords.

In most warm countries there is an abundance of starchy and sugary food, and but little animal. How shall this existent provision be made most available for the prolongation of life? Let us refer back to the principle on which were reckoned in the first part of this volume the requirements of

the body for its daily work (p. 8), and draw the obvious inferences therefrom. The diet is, in hot countries, perforce one that entails the loading the digestive organs with a great excess of carbon in order that enough nitrogen may be obtained. In the first place, therefore, the carbon should not be in too rapidly digestible a form. Starch and vegetable fibre, as supplied by grain and green food, are better than oleaginous matter in warm climates; for while the former only overloads the intestinal canal, the latter overloads the blood and tissues with useless and deleterious products. Then, it is essential that no frequent calls should be made for unusual exertion: the muscles and nerves must not be worn out, for the materials of their repair are few. Moreover, the supply of food must be continuously copious and accessible; for starvation is badly borne by him who is hanging on to life 'by the skin of his teeth.' No sudden changes must be made in the dietary, even in the form of the vegetable food; for a new article is with difficulty digested by an unhabituated stomach, though it should be perhaps more ordinarily digestible than the usual nutriment. This is not the case with meat eaters, who can bear change much easier from one kind of flesh-food to another.

The English reader's interest in his fellow-subjects will naturally suggest to him the important bearing which these considerations have on the duties of both government and individuals towards the inhabitants of our Indian possessions. Our first business is to keep them alive at whatever cost to ourselves; and the next to render them as little dependent as possible on the accidents of drought, flood, and other unfavourable contingencies of season, partly by storing grain, and (what is infinitely more important) water, the means of producing grain, from one season to another. Tanks, artificial lakes, irrigation works, and roads, stamped with the latest improvements of modern science, will preserve the memory of our rule when the bronze statues of our leaders are as unintelligible as the Memnon. Who cares for, or knows of, the martial exploits of the Pharaohs? Yet their successful efforts

for regulating the food supply of Egypt preserve fresh, for ever, our grateful remembrance of them. The heaven of nations is in the hearts of men.

Again, we must not expect to get work out of vegetable feeders in return for our bounty. If required to exert themselves in any unusual way, when food is deficient, they simply die. The reason is evident: they have been living on their own tissues, and the small quantity of albuminous matter in grain is a long time in building them up again; so that for weeks or even months their muscles are in a state of atrophy. A broken watch must be repaired before you call upon it to go.

Also, any variations made in the nature of their food must be very gradual and well considered.

Still, there is no impossibility in the gradual introduction of changes, at least in the preparation of food. Some method might be popularised of augmenting the proportion of nitrogenous matter in the dietary by mechanically reducing the carbon, such as produces in Italy the highly nutritious macaroni. Starch is readily washed out of the grain, and is itself a valuable article of commerce for industrial purposes, as well as being capable of conversion into more digestible substances for use as food. Also the separation of starch and the storing it in a form less liable to decomposition and the ravages of insects than ordinary grain, would be a great source of safety to a graminivorous people.

I had a striking illustration of the different values of vegetable and animal food a few years ago in the case of a robust Hindoo gentleman, who habitually lived on rice and vetches, which he imported himself from Bombay, and had cooked by a servant of the same faith as himself, so that his meal should not be defiled by the touch or even the look of a Christian. The said servant went holiday-making to Greenwich, got drunk and into the lock-up, so that his master had an involuntary fast of nearly two days. And then he was so weakened that the labour of opening his letters brought on

hiccup, vomiting, and extreme depression, so that he could not take food when, at last, he obtained it. The mention of beef-tea was an abomination to him ; he said, his ancestors had not put in their mouths animal food for 6,000 years, and he was not going to begin. But when the abominable substance was craftily introduced to the other extremity of the digestive canal, it seemed to flow directly into his veins, which filled with blood, and he was well. The absorbents had clearly not lost their natural habits by disuse for so many generations.

Where the circumstances of a country are such that plants suitable for food cannot be grown, while there is a sufficient supply of animals to nourish the population, the inhabitants are hardy, enduring of extreme cold and heat, and capable of violent physical exertion. But steady daily labour wears them out, and is abhorrent to their feelings. We may instance, as under several varieties of temperature, the Esquimaux, the Indians and half-breds of the Pampas, the Tartar hordes, and the Arabs of the Nubian Desert. These nations of meat-eating hunters and herdsmen are mightily strong and prolific, and have fulfilled to them the promise made to the sons of the wild Sheik Jonadab, of never lacking 'a man to stand before the Lord for ever.' But that is only so long as they follow their ancestral traditions, and retain habits suited to none but sparsely inhabited lands. When the inevitable tide of civilisation overtakes them, and they become cultivators and craftsmen, they fall under the natural laws of population and take their chances with the rest of mankind. Often, indeed, the day goes against them in the fight of innovation, especially if it has been sudden ; they fade away childless under our very eyes, like that vast American tribe of which, it is said, the only remnants are a chief, a tomahawk, and six gallons of whisky. The only possible remedy for this terrible state of things is beef. Our progress is progressively poisoning off our weaker brethren ; we are no more to blame for it than we are for crushing the harmless beetles and daisies that lie in our path. Still, we are bound in mercy to tide them over the struggle, to

let them assimilate gradually with the more civilised world. Hunters should have facilities afforded them of becoming herdsmen, and, in course of generations, from herdsmen, farmers and gardeners; for the immediate transition from a purely animal to a principally vegetable diet, though borne by the individual, is fatal to the race.

The action of climate on diet seems to be affected by the food produce which it enables the soil to bring forth. The fixed inhabitants grow accustomed to it, and, according to the law of the survival of the fittest for the peculiar circumstances, are prosperous and prolific as a race, and healthy as individuals, while following their ancestral habits. But that historic fact does not at all show either that the diet is the best abstractedly, still less that it is the best suited to foreigners. It seems absurd to argue that the inhabitant of the Polar Circle lives on fat animal food because it is so cold, and, at the same time, that the burning plains of the Pampas are a reason for thriving on flesh and water only; or that the climatic circumstances of North Norway and Southern Spain are the cause of the inhabitants living almost entirely on bread. The best diet in the abstract is a mixed diet, and mixed in the proportions selected by the experience of the most civilised nations. And it is also the best for the individual who is accustomed to it to adhere to, under whatever sky he may be wandering. The higher the health he enjoys, the more nearly he approaches to the true aim of being in training, the better he is able to resist the adverse circumstances he may be subjected to. Experience does not justify an agreement with those dieticians who desire us to alter our commissariat in accordance with the example of those among whom we dwell for a season, or in obedience to the thermometer, and M. Cyr is indubitably wrong when he blames Britons for 'retaining their customary substantial regimen under other skies and in hot countries.'[1]

In India and in Africa our soldiers suffer from fevers,

[1] *Traité de l'Alimentation*, p. 221.

ague, dysentery, and are liable to contract cholera and other epidemics. But the camps of our foes are usually still more severely ravaged at the same time; and it is observed that those suffer least who continue the habits of sensible men at home. Inflammations and degenerations of the liver also afflict our countrymen in the East, and a certain proportion of this evil is due to intemperance, as it is in England; but the great majority of the cases are traceable to the consequences of malarious fever. It does not appear that those who make a rational use of alcohol, as they would have done at home, suffer more than the abstinent. The principal thing to be remembered is that as the outgoings of water by skin and lungs are very great, the ingoings must be great also, and therefore that the fermented drinks must be taken in a dilute form, otherwise, thirst will cause an excess of stimulant to be consumed. This applies equally to the warm summers in dry temperate climates, such as Italy, as well as to tropical regions.

The object of attention to diet in unaccustomed climates should be to accommodate to the demands of the system the food which can be obtained, and to which we are obliged by necessity to restrict ourselves. If starchy food is to be got, solely or mainly, a great deal of it must be eaten, and the digestion of this unusual mass is facilitated by being taken alone and not mixed with meat; and the meat, when it comes to hand, should form a separate meal. Thus the full force of salivary digestion is brought into play. Involuntary vegetarians are apt to starve themselves from want of inclination towards the flavourless viands. They should be warned of the danger of this. If nothing but animal food is within reach, again, still more is it imperative to eat largely, if the body is to be preserved in its integrity, as has been argued in a previous chapter (p. 8). Sir John Ross found the Esquimaux devouring about twenty pounds a day of meat and blubber. And his experience among his own men leads him to urge the desirability of acquiring, previously to a contemplated winter residence in Polar regions, a taste for Greenland

food, the large consumption of it being the true secret of life in those frozen countries. 'The quantity of food,' he says, 'should be increased, be that as inconvenient as it may.'[1] Again, Sir Francis Head, in his famous journey across the burning plains of the Pampas, where beef and water were the only victuals to be had, got himself into magnificent condition, not by dint of the limited slices of civilised society, but by eating flesh, morning, noon, and night, liberally.[2] Under both circumstances the addition of a small quantity of vegetable food would have rendered needless the excess of nitrogenous aliment.

When the Englishman is in foreign countries it is more necessary than at home to pay that attention to diet which will ensure the highest attainable health and condition. For to his constitution, at any rate, if not absolutely, every place is less healthy than England. Plagues of all sorts, terrestrial and celestial, beset his path, and he must walk warily if he would return sound. Perhaps, at home he may have lived carelessly, and been lucky enough not to suffer, but he cannot hope for the same good fortune under less favourable auspices. This caution is not required by the sensible readers of these pages, but it may be useful in its application to their less wise dependents and clients, who, in countries where one is always thirsty and there is abundance of drink, are as apt to yield to temptation as in England. The punishment of stupidity is surer and heavier than they are led to anticipate by former experience.

Exercise and clothing should be accommodated to the food. We should not in these particulars copy the manners of natives any more than we do their dietary. Active muscularity and field sports render the body less likely to suffer from the solar and malarious influences to which they, to a certain extent, expose those who pursue them; and the simple precautions of keeping the skin dry and warm after exertion, and

[1] Ross, *Second Voyage for the Discovery of the North-west Passage*, p. 413.
[2] Head's *Journey across the Pampas* (1828).

of taking small preventive doses of quinine, will make these healthy pleasures nearly as safe in the tropics as in Europe, times and places of extraordinary risk being avoided.

In the selection of fit persons to undergo, with safety to themselves and others, exposure to extremes of either cold or heat, the surest guide is their power of gaining weight and condition under a course of training. These are not always persons of the biggest muscles and bones; indeed, a moderately sized frame is the toughest as a rule. Sheer pluck will sometimes enable a most unfit subject to pass undetected through tests of endurance; and doubtless such a temper is valuable in a colleague; but it will not supply the place of hardihood. The surest proof of hardihood is improvement under training.

As the women desiring to undergo bodily hardship are more exceptional than men, so is it all the more necessary to test them thoroughly. Their desire is almost always the self-sacrifice of love; but they do not wish to burden others with bitter memories or to injure the object they profess to aid, as happens if they break down. The world has less direct claim on their assistance, and therefore they should not offer it without being sure that it is really worth having. This specially applies to the wives of missionaries, travellers in new countries, emissaries to barbarous nations, and the like. They are of incalculable service while sound, but a serious impediment when sick. Their enduring courage may be taken for granted, as it is proved by their volunteering. But unless they grow in strength and weight, or at least preserve their weight, under a course of training, their place is home.

The standard chapter in dietetic treatises on the due influence of the seasons on the selection of food in temperate climates does not exhibit any practical contributions of science. We hardly require to be told to indulge more in weak potations in July than in December, or to eat a better dinner when our appetite is braced up by a frost. Some of their refinements remind one of the dandies in Imperial Rome who wore heavy finger-rings in winter and light in summer, and are

beneath the notice of a healthy man. Some are positively repugnant to experience, as, for example, the recommendation to keep out the cold by eating sugary and starchy dishes, on the ground that they are producers of heat by combustion. The loss of heat by evaporation makes it quite as necessary to sustain the temperature of the body in summer as in winter, and the same amount of force has to be elicited; so that, as a matter of fact, meals of bread and pastry and sweet fruits are more seasonable in warm weather than in cold, for they cause less feverishness and excitement than meat does. The succession in their due season of marketable articles affords a sufficient guide to their selection. As an almost universal rule they are wholesomest when cheapest, if the simple directions given already for securing their soundness and freedom from adulteration be adhered to.

Sir James Clark[1] remarks that 'Change of air is not more valuable as a remedy in the cure of disease and its consequences, than as a preventive of disease, more especially in childhood and youth.' It is upon the appetite that its effect is first marked, and no doubt this is most prominent when the change is from an impure to a purer air. Yet I have known the mere change alone to have a beneficial influence, as, for instance, a removal for a time from the sea-side or the fresh breezes of the Worcestershire hills to London. Observation does not incline me to have faith in the doctrine of acclimatisation. It seems to me that a long residence in a climate, instead of rendering it more salubrious to the resider, makes it less suitable in close proportion to its length. I cannot at all join Claudian in his praise of the old man of Verona, who attained the age of ninety without ever going out of the suburbs.[2] He used his natural toughness to set a very bad example to his neighbours; and if many followed it, I am sure some must have suffered in mind and body.

In choosing a place of education for children, it is desirable

[1] *Cyclopædia of Practical Medicine*, i. 49.

[2] *De sene Veronensi epigramma.*

that the climate should be decidedly different from that enjoyed at home during the holidays. Denizens of the stagnating, oft-breathed atmosphere of a metropolis will do well to select a country school; dwellers on the high ground of central England will find what suits them best on the coast; while both the sea-siders and country folks may venture, without risk of deterioration, to secure for their growing families the many advantages of instruction in a town.

Clergymen whose health is below par and even verging on disease, will often gain wonderfully by a mutual exchange of duty, *provided the climates of their several spheres are different.* Satirists say that parsons' livings always disagree with them; and there is a strong spice of fact in the statement; it is not fancy, but a real stagnation, from monotony in their aerial and other surroundings. The remedy is easy and cheap, but the physiological conditions of it should be clearly understood. It would be a profitable subject for bishops and archdeacons to dilate upon in their charges, as it is quite as important to the public that clergymen should be kept in repair as that churches should be so attended to.

CHAPTER IX.

STARVATION, POVERTY, AND FASTING.

Starvation.

THERE has always been a certain amount of importance attached to the diet and regimen of the sick, but not till the present generation do we find any notice taken by men of science of the consequences to the healthy, of its insufficiency or imperfection. The remarkable researches of Chossat on Inanition[1] form the first important work published on this point. The results deduced by this physiologist from his experiments have only been confirmed and expanded by later observers.

The first and most important principle established by Chossat is that absolute deprivation of food and deficiency of food are physiologically identical in their action on the animal life. One acts quicker than the other, but the difference is merely one of duration and degree. Both are equally fatal in the end, if not interfered with; and the end in both is regulated by the same law. Death arrives when the body has lost $\frac{6}{10}$ of its weight, whether that happens after days, or months, or years.

The loss of temperature is a feature common to and identical in both. Starvation or abstinence proved almost always fatal, in Chossat's observations, whenever the animal warmth fell to about 76° (Fahr.) in a red-blooded creature. The importance of the loss of temperature was shown by the fact

[1] Chossat *sur l'Inanition*, Paris, 1843.

that a renewal of consciousness and nerve-power could be effected, even from the torpor preceding death, by the application of external warmth. This fact affords a most valuable hint for the management not only of absolutely starved but of poorly fed individuals.

The sensations of hunger need not be described. After a time these are appeased, and are succeeded by a working and a grumbling and a dull aching in the small intestine. Then the secretions of the abdominal canal diminish and finally nearly cease. Digestion becomes more and more difficult, the longer the abstinence. In fact, an insufficient diet is not only hurtful immediately, but it brings on an additional danger which acts in the same direction, namely—an impediment to absorption. The appetite falls off, and it is only from habit that the sufferer is induced to seek the food for want of which he is perishing.

There is absolute constipation, as may be daily noticed in hysterical subjects and others who do not take nutriment. And the forcible relief of this constipation by drugs makes matters worse, as we may also observe in the same hysterical subjects under foolish maternal discipline.

The breathing goes on gradually getting slower and less deep. In a case of starvation for twenty-four hours, Dr. Smith found the exhalation of carbonic acid fall from 34 ounces *per diem* to 22 (Philos. Trans. 1859). Fasting ecstatics hardly seem to breathe at all; and if you watch at rest a London needlewoman, or pauper before she goes into 'the house', the motion of the ribs cannot be seen, so little air does she draw in. Contrasted with this is the gasping rapidity with which the respiratory muscles act when forced exertion sets them in motion.

The alterations in the blood consequent on insufficient food depend on whether there has been a deprivation of water or not at the same time with solids. If there has, strange to say, the proportions of the ingredients of the circulating fluid are not affected, but the whole quantity is diminished. In

animals starved to death, three quarters of the blood was gone. But where water is abundant, and the starvation gradual and not immediately fatal, it is easy to see by the colouring of the lips that the change consists in the dilution of the nutrient stream with aqueous fluid. In a ghastly picture exhibited at the last season of the Royal Academy (1874), 'The Door of a Casual Ward,' it was singular to notice how the secret of the weird and true effect of colour lay in the omission of vermilion from the flesh tints. This abstraction was natural, for the reason that it was an imitation of the inner work of nature, not of the mere outside.

The nervous system shows how it suffers from inanition by giddiness, fainting, hallucination and delirium. During sleep the dreams are most characteristic, presenting wondrous scenes of festivity and sensual enjoyment. Lately Mr. Parrot[1] has believed he has traced to inanition certain tissue changes in the nervous system, as well as in the other viscera, which would appear to be the material expression of the functional derangements first named.

In an account by Mr. Brett in the 'Medico-Chirurgical Review' (1841) of the denizens of the Indian prisons at Moorshedabad, Cawnpore, and Shahjehanpore, one of the most notable results of insufficient food was a peculiar glassy appearance in the eye followed by inflammation and ulcer of the cornea, a copious secretion of tears and from the Meibomian glands, and finally blindness from destruction of the eyeballs, and death by emaciation. Strange to say, these dreadful symptoms in such a sensitive part were accompanied by no pain. The same phenomena were observed long ago by Magendie in dogs starved to death by deprivation of all nutriment, and they occur also when gelatine only is supplied.

Among the poor, especially among children badly fed, very

[1] *Compt. rend., Acad. des Sciences,* 1868, t. ii. p. 412. Dr. Brown-Séquard calls this *Stéatose interstitielle diffuse de l' encéphale.* By long-lasting insufficiency of food the brain is more or less converted into a suety substance.

similar affections of the eyes are frequent. They rarely, however, go on to the lengths mentioned above, for the sufferers come under medical care, are sent into hospitals or parish infirmaries, and are reinstated with nourishing diet. A recognition of the true origin of many ophthalmic epidemics in reformatories, pauper nurseries, and such like collections of infantile weakness is very necessary to be impressed upon the managers of those institutions. Not being medical men, they are prone to apply, universally, principles of regimen suited only to their own over-fed nurseries, and to cure all inflammations by restriction, till they discover their mistake by sad experience.

If the lack of nitrogenous food is too prolonged, since it is the blood which is subjected to the greatest drain, and since in fat persons the blood errs by defect rather than by excess, inanition can exist while the body still retains its fat. In the case of the Welsh fasting-girl [1] the body was found after death plump and with a considerable quantity of adipose tissue upon it, though the jury was quite right in finding that she was indubitably starved to death. This is a fact of great importance in practice: one must be very circumspect in starving or bleeding a stout patient; doubtless the store of adipose tissue may serve partly to nourish him, but it will not keep him alive. In our treatment of the poor we must apply the same reasoning, and not suppose that because a client, especially in

[1] This was a case of notorious imposition which the daily papers in 1869 detailed very fully. The parents made a show of her, decking her out like a bride on a bed, and asserting that she had eaten no food for two years. Some reckless enthusiasts for strict truth set four trustworthy nurses to watch her; the Celtic obstinacy of the parents was roused, and in defence of their imposture they allowed death to take place in the usual time which it does after total deprivation of food. They were found guilty of manslaughter with perfect justice, for the law rightly supposes everybody to know that a human being without food must necessarily die. There was no need to prove the fact by a cruel experiment, and to visit a poor crazy swindler with the punishment of death. Thus to take the moral government of the universe into private hands is quite unjustifiable.

old age, is fat, that he is therefore in good case and capable of bearing restricted diet. Jailers have sometimes attempted, really more from mistaken kindness than harshness, to 'tone down' an obese prisoner with hard fare; and the consequence usually is that the country is put to the expense of sending him to the infirmary.

When entirely deprived of nutriment we are capable of supporting life for little more than a week. The Welsh fasting girl lived for eight days from the commencement of the time she was carefully watched. But so many circumstances influence the amount of resistance which the body can exhibit, and make it vary so much, that no practical importance attaches to the theoretical limit of possible existence.

One thing which remarkably prolongs the duration of life is a supply of water. Dogs furnished with as much as they wanted to drink were found by M. Chossat to live three times as long as those who were deprived of liquids and solids at the same time. Miners who have got shut up in damp headings have experienced much relief by getting moisture from the walls of their prison. Even wetting the skin with sea-water has been found useful by shipwrecked sailors. The fact is water is a food, necessary to the building up of the body, and I think a great mistake is made when we caution the underfed against a free use of it. And, moreover, water prevents that concentration of the circulating fluid which impedes absorption, and which is a serious hastener of fatal results in those who have not enough to eat.

Though, as was before noticed, a certain amount of fat on the body does not prevent the blood from being impoverished, and by its impoverishment leading to injurious results, yet fat is a considerable protection against starvation. The old tale of the pig which was buried by the fall of a cliff at Dover, and was dug out alive after 160 days, as recorded by Mr. Mantell, the naturalist, sixty years since in the 'Transactions of the Linnean Society' (vol. xi.), is a standing case to cite. The loss of substance, amounting to three quarters of the entire

animal, is probably an exaggeration, as the weight previous to the imprisonment is estimated by guess; but still the duration of the starvation, palliated only by the moisture which oozed through the sides of the sty, is very remarkable, and may certainly be taken as evidence of the protection afforded by the adipose tissue.

Life can be supported by a very minute quantity of food as long as complete inactivity of body is maintained. But under such circumstances the slightest exertion will bring on a fatal result. I attended for a long time a surgeon whose power of swallowing was completely lost by cancer of the œsophagus. He was cheerful and happy as long as he lay in bed, but at last during my absence from London, he thought a trip to Greenwich in a steamer would be an agreeable change, and died immediately after the exertion.

An even elevated temperature and the exclusion of the sun's rays, as in the 'dim religious light' of a closed bedroom, will enable life to go on slowly for a marvellous period; as in the case of ecstatics, fasters, hysterical and insane persons. But if these are suddenly routed out, mentally excited, and forced to live like other people without due preparation, they die in spite of the soundness of all their organs. It is the same with convalescents from acute fevers, if they are injudiciously roused to mental or bodily activity.

Sex seems to have no appreciable influence on resistance to deficient diet. But it is not so with age. It is an observation of the rough old times when famine was oftener seen (and therefore we may trust Hippocrates)[1] that the younger a human being is, the easier is it starved, till we come to extreme old age, when the powers of life are considered by some physiologists, Celsus among the number, to give way quicker under famine than those of middle-aged men. However, there is no difference of opinion as to its effect upon

[1] *Aphorism* xiii. Hippocrates does not define who are the γέροντες, who he says bear starvation best; but as an Ionian he would probably include all over 45.

children. Very large is the number of victims to this law of nature, and Malthusian optimists may admire its equity in balancing population and food. Nevertheless, so long as wide tracts of the earth lie uncultivated, we may not imprudently suspend its operation as much as we can. Dispensary and parochial practitioners are sadly familiar with a mass of infantile sickness and death which they classify on paper to a certain extent, under heads prescribed by the Nomenclature of Disease, but which appeals to their hearts by its real terrible name 'Starvation.' Europe is deeply indebted to M. Parrot for the bold outlines with which (in the 'Archives de Physiologie' for 1868) he sketches the condition in which an innumerable army of speechless martyrs are found in the great centres of civilisation.

'In these little creatures,' he says, 'we see the functions growing weaker and weaker with extreme rapidity, though in a gradual manner. The temperature, often lower in the interior of the body than in the axillæ, falls below 92° (Fahr.) and is never above 95°. (We all know what 'blood-heat' is). Usually not more than 90 beats in a minute can be counted in the pulse; once the number was over 100, in another case it was below 64. The respiratory movements were less frequent than in the normal state and often very weak. The cries, which in some were at first intense and prolonged, ceased little by little. The secretions, always scanty, ended by disappearing; more than once the napkins put on in the morning were taken off in the evening unsoiled and dry. The skin, rigid, dry and cold, often oozed out a serous fluid, especially in the dependent parts of the body. Motionless in their cradles, icy cold, with the face livid and drawn, as if they were mummied, these still living babies looked like corpses. The beating of the heart could not be heard, and were it not for an occasional movement of the breath at long intervals, it would have been thought that a body some time dead lay under the eyes. In very truth, death had already taken possession, slowly indeed, and as it were

molecule by molecule, but with a sure and fatal grasp. . . The death of these children is due to starvation; and the diseased appearances revealed by a *post-mortem* examination, should be looked at not as the cause of the malady, but as its inevitable consequences.'

A common symptom, in children, of a diet deficient in nutriment is diarrhœa. It assumes, when severe, the dysenteric type, streaks of blood appearing in the light green, mucous evacuations. And so it gets entered in the register as 'dysentery' or 'inflammation of the bowels' or 'enteritis.' But it does not appear to be contagious or epidemic, like the dysentery of camps; and in hard times may be observed confined to the children of a district, to the children in arms even, according to the mode in which the pressure of scarcity falls on the population.

Yet the sufferers are probably neither deliberately, nor completely, perhaps not even knowingly, deprived of nutriment—

> Evil is wrought
> By want of thought,
> As much as by want of heart.

Ask what they are fed upon, and compare it with what rational experience prescribes, controlled by the universally spread teachings of physiology, and you will see immediately that the dietary errs in not containing the essentials of existence. The food is not, strictly speaking, unwholesome, but it errs by defect. It is not food at all. Reference to Chapters I. and II.[1] makes this clear. It is there pointed out what children *should* eat, and everything else is what they *should not.*

Not only youth, but health and vigour render the body less tolerant of abstinence. Invalids bear it better than strong people, with a few special exceptions. Such of us as have passed middle life cannot but remember, during the old reign of depletion and restriction, when for fear of victualling the disease they famished the patient, instances of the extreme toughness of the human race. Among the sick, not the sound,

[1] Pp. 129 and 139.

these instances are recollected. It is an act of mercy, when, in sieges, in shipwrecks, and such-like disasters, meat and drink are scarce, to supply those on the invalid list first and most bountifully—no doubt it is an act of mercy, and to the honour of mankind will probably always be done—but the physiologist must pronounce it highly imprudent and far from being conducive to final success; for the vigorous and active, whose blood is circulated rapidly, and whose muscles are in constant movement, really suffer most, not only in feeling, but in their future health and strength.

In order to preserve life as long as possible where sufficient food for subsistence cannot be obtained, our aims, then, should be to secure water, warmth, and complete inaction of the muscles. The direst famine does not necessarily exclude these preservatives, and in the more insidious scarcities whose effects are noticed chiefly in children, we can very often readily get as much of them as we want.

In the apportionment of a spare supply, the youngest should have the nearest approach to a full ration, the active men and women the next, and the invalids and aged the scantiest allowance. So is distributive justice best satisfied.

It is a strange thing, and one which at first sounds paradoxical, that the supply of the stomach even from the substance of the individual body itself, should tend to prolong life. A case of starvation for twenty-two days in an open boat was recorded in the periodical prints last spring (April 30 and May 1, 1874) in which the poor victims fought in their delirium, and one was severely wounded.[1] As the blood gushed out, he lapped it up; and instead of suffering the fatal weakness which might have been expected from the hæmorrhage, he seems to have done well. I would not build much on the rough memories preserved during such awful sufferings, were it not for the support afforded by some experiments by a French physiologist, M. Anselmier, to whom the idea

[1] Three men and two boys were out for 32 days with only 10 days' provisions, exclusive of old boots and jelly-fish.

occurred of trying to preserve the lives of some dogs by what he calls 'artificial autophagy.' He fed them on the blood taken from their own veins daily, and he found that the fatal cooling incident to starvation was thus postponed and the existence consequently prolonged. Life lasted till the emaciation had proceeded to $\frac{6}{10}$ of the weight, instead of $\frac{4}{10}$, as in Chossat's experiments, and was extended to the fourteenth instead of the tenth day, which was its limit in those dogs who were not bled.[1]

It is not likely that anybody will feel himself called upon to repeat M. Anselmier's dreadful experience, but no one of us who run to and fro in the earth is secure from the possibility of shipwreck, or being buried alive, say in a mine or railway cutting, and thus involuntarily contributing a self-sacrifice to that knowledge which may save the lives of others. For one famished crew that is picked up, there are found dozens of empty wrecks, of which it is never known how the once living freight fared; and for each empty wreck there are dozens which have left no trace. The prolongation of life without provisions is by no means a mere speculative discussion. Were I in such a strait as above referred to, my reason would counsel me, and I hope I should have the courage to wound my veins and suck the blood.

After starvation, either complete or partial, a sudden return to full diet is not to be attempted. Small quantities at a time of the most digestible food must be given. And the temperature should be artificially sustained till such time as the system is able to generate its own heat, especially in the interior of the body. Tablespoonfuls of hot beef tea and of milk, constantly administered ('tea-cup diet'), form the most appropriate nutriment. And it will be much assisted by

[1] *Archives Gén. de Médecine*, 1860, vol. i. p. 109. M. Anselmier conjectures that the formation of heat was due to the keeping up of a certain degree of activity in the gastro-intestinal absorption, and the consequent chemical action in the interior of the body, where it would not be lost by radiation.

admixture with a small quantity of pepsine; but not too much, or there is risk of diarrhœa.

Poverty.

The valuable calculations of Dr. Playfair, 'On the food of man in relation to his useful work,'[1] enable us to arrive at a very practical estimate of what amount of solid victual is required by an adult living by bodily labour, to preserve his health under various circumstances. The circumstances which chiefly influence the required amount can be classified as follows:—

1. Bare existence;
2. Moderate exercise;
3. Active work;
4. Hard work.

1. The diet of bare existence—'subsistence diet'—is calculated from the mean of sundry prison diets, of the convalescents' diet at hospitals, that of London needlewomen and of that supplied during the Lancashire cotton-famine, as reported by Mr. Simon. The result is that in a condition of low health without activity, $2\frac{1}{4}$ ounces of nitrogenous matter (calculated dry), 1 ounce of fat, 12 ounces of starch and $\frac{1}{4}$ of an ounce of mineral matters *per diem* are necessary. The contents in carbon are 7·44 ounces. This, being interpreted, means that a man will die gradually of starvation, unless his provision for a week contains three pounds of meat with a pound of fat on it or the same quantity of butter or lard, two quartern loaves of bread, and about an ounce of salt and other condiments. If he cannot get the meat, he must supply its place with, at least, two extra quartern loaves, or about a stone and a half of potatoes or between 5 and 6 pounds of oatmeal—unless, indeed, he is so fortunately situated as to be able to get skimmed milk, of which five pints a week will fairly replace

[1] *Lecture delivered at the Royal Institution*, London, April 28, 1865, published by Edmonston and Douglas, Edinburgh.

the meat. Let it be understood that all these articles must be good of their sort, and contain no indigestible matter or adulterant. And there is no economy in substituting for real nutriment things which merely stay the hunger by occupying the stomach for a longer period. The completeness of the digestion is thus interfered with, and a morbid derangement of the function induced, which causes part of the food to be wasted.

A person brought to bare existence diet can undergo no toil, mental or bodily, under the penalty of breaking down.

2. By moderate exercise is meant the equivalent of some—say from 5 to 7 miles—walking daily. Dr. Playfair takes as fairly representing the appropriate food of this class the dietaries of English, French, Prussian, and Austrian soldiers in a time of peace. The English soldier on home service, according to Dr. Parkes, receives from Government five pounds and a quarter of meat and seven pounds of bread weekly, and buys additional bread, vegetables, milk and groceries. Now, such a diet as this is amply sufficient for anybody under ordinary circumstances of regular light occupation. But should extra demands be made upon mind or body, weight is lost, and, doubtless, if the demands continue to be made, the health would seriously suffer. Mr. Buckland, of the Guards, remarks (Soc. of Arts Journal, 1863, quoted by Dr. Playfair,) that though the sergeants fatten upon the rations, the quantity is not sufficient for recruits during their drills.

3. Active labourers are reckoned those who get through such an amount of work daily, exclusive of Sundays, as may be represented by a walk of twenty miles. Of this class are soldiers during a campaign, letter-carriers, engineers employed in field work or as artisans. These habitually consume on the average about a fifth more nitrogenous food and twice as much fat as the last class, while the quantity of hydrocarbons is not augmented, except in the Royal Engineers.

4. Hard work means that which is got through by English navvies, hard-worked weavers, full-fed tailors and blacksmiths. It is difficult to get exact information, but it would appear

from Dr. Playfair's estimates that the addition to the diet is entirely in nitrogenous constituents. The higher their wages the more meat the men eat.

This neglect of vegetables by the two last classes is in a physiological point of view imprudent, and possibly may be a contributing cause of that inordinate desire for alcohol which impoverishes and degrades them. The discovery of the production of force from the assimilations of starch leads to a knowledge, opposed indeed to old prejudices but supported by experience, that the raising of the energies to their full height of usefulness may be effected by vegetable food proportioned to the increase of requirement, quite as well as by the more stimulating and more expensive animal nutriment.

Deficient diet, like all morbid conditions both corporeal and mental, is a vitiating and degenerating influence. Famine is naturally the mother of crimes and vices, not only of such sort as will satiate the gnawing desire for food, but of general violence and lawlessness, ill-temper, avarice, lust, and cruelty.

The love of purposeless destruction exhibited by the Parisian communists in our own day may be fairly credited to deficient food. No well-fed people could have wrecked the Vendôme column or burnt the town-hall and Tuileries, of which they were so proud. They were like hungry children smashing their dolls. And Thucydides, Boccaccio, and Defoe are all agreed as to the hideous wickedness exhibited at Athens, Florence, and London, during their famine-fevers. The exceptional instances are those where individuals or nations have conquered by courage and self-restraint their natural selfishness, and have made the interests of others paramount to their own. Am I blinded by love of my country, or may I justly quote the history of the Lancashire cotton-famine as a case in point?

In all physiology there is no more convincing proof of the benevolent government of the universe and of its perfecting influence upon our race, than the fact that directly a man begins to care for others in preference to himself alone, his

care ceases to wear and exhaust him. It rather seems to be a sustaining force. Observe a lunatic, induced to work hard for some worthy object, he grows fat; let him sit still and brood over his wrongs, and he dies emaciated. Let a hypochondriac's wife or child fall ill, he is cheerful and well directly; but he relapses as they become convalescent, and grows as thin and miserable as ever when he turns his attention to his own health. This is the reason why in sieges and famine medical men have often remained sleek and plump, while their neighbours pined, and perhaps also why military officers bear short rations better than the men. Like all divine truths, 'to love your neighbour as yourself' is found to be taught by material nature as well as by revelation.[1]

Fasting.

Fasting is the voluntary restriction of the diet for the express purpose of developing the higher features of the mind. It is 'a means of grace,' and approved as such by religious men of most opposite creeds and diverse nationalities. I am not going to question their experience, and I should bow to it even if it differed from my own, which is not the case. Like all the material machinery by which the bodily man influences the spiritual man, this 'means to an end' not only admits of, but requires frequently to be brought into harmony with, the progress of knowledge concerning physical life. And therefore I think that in a manual of this sort mention of it should not be omitted.

In the first place, to be useful, fasting must be wholly *voluntary*. If forcibly imposed even by imperious custom or enjoined as an end in itself, its principal effect is to sour the temper and narrow the intellectual apprehension for the time

[1] Professor Maurice well remarks in the preface to his *Moral Philosophy* that the difference between revelation and discovery is shown by the words themselves to be very slight; one is removing a veil, the other is removing a cover.

being. In fact its physiological action is a minor degree of starvation.

To secure its being wholly voluntary, it should be private, as advised by the highest authority of all.

At the same time that the act is voluntary, the manner of it is best prescribed by another. If the peculiar form and degree of abstinence are self-imposed, they are apt to be excessive, and to do harm without any corresponding advantage.

One of the highest mental developments to be expected from fasting is the power of self-control by voluntary effort. If a man finds himself during a fast weakened in his ability to concentrate his thoughts and to keep up his attention, it is doing him no good. If the instinctive appetites, implanted by nature, fail after it, injury to the health and individual degeneration follow. For these reasons it is best that the matter on which abstinence is exercised should be rather a luxury than a necessary. It is quite safe for a healthy man to leave off tobacco, wine, or beer, spices and sauces, hot meat, or even meat altogether, or vegetables altogether (if vegetables are a luxury to him), or pastry, or sugar, or butter for a day or two at a time; especially if he withdraws himself from the bustle of the daily occupations. But it is not wise to do this too frequently, or to let the low diet become habitual. Like all acts of free will, it is most powerful in its effects on the mind when rare, and when it presents the strongest contrast to the usual life. If once they become habits, the spiritual influence of acts ceases.

Those who never feast will find a difficulty in advantageously fasting.

CHAPTER X.

THE DECLINE OF LIFE.

Everybody who has passed the age of fifty (or thereabouts) with a fairly unimpaired constitution will act wisely in diminishing his daily allowance of solid food. At the 'grand climacteric' (as this turn of life is pompously called) the movements of nutrition are retarded, and the constructive and evacuating actions of the system being diminished, there is less call for materials of repair. It becomes a moral duty to avoid all articles of diet which personal experience has shown to be difficult of solution, to make smaller meals, and, if need be, more frequent meals, so that the stomach may be never overloaded or too long idle. The saving up an appetite for the enjoyment of an abundant repast may be conceded as a harmless folly in our juniors, but it is a shame to a grey head. If custom has made a man a large eater, he should endeavour to 'spoil his dinner' by a late luncheon, and to prevent his appetite being too keen at midday by breakfasting not over early.

Very aged people, however, and those who have lost their teeth run some risk of not being sufficiently nourished, from swallowing their food rapidly. They are hurried over their meals through the thoughtlessness of those around them, and since they chew slowly and secrete saliva slowly, the food remains undigested. Their juniors should remember this, and govern themselves accordingly. A kindly British matron, who spent more hours at table than was good for her, told me that if she did not do so, she 'should be a widow in a week,'

and that she habitually ate too much to keep her aged husband in countenance. Not a word could be said against such pious gluttony.

The dishes of meat should be as soft and tender as possible, and the firmer kinds should be finely cut with a mincing knife. But vegetables should not be over-softened in cooking: there should be sufficient resistance in them to make chewing imperative, so as to excite the secretion of the fluids of the mouth, which are required for their solution. Soups and broths are nutritious, but should not contain solid vegetables, except just enough to flavour them. Puddings and pastry are not of much use, and overload the tired stomach.

I do not know the authority for the old proverb *vinum lac senum*, but it seems a very dangerous one, as it may lead our ancient friends to think they may treat it like mother's milk, and measure its benefits by the quantity imbibed. The saying however does partially embody a truth, namely—that in the decline of life the advantages derived from fermented liquors are more advantageous, and the injuries it inflicts less injurious than in youth. The effect of alcohol is to check the activity of destructive assimilation, the rapidity of that moulting of the body's substance by normal secretion which in healthy youth cannot be excessive, but which in old age exhausts the frame. Alcohol calmly arrests the energies of the nervous system which would fret the tissues to decay, and would seriously weaken them, were not the wear and tear to be continuously replaced by new material. Now, with years, the replacement by nutrition is much diminished, and we, nevertheless, are apt to persist in using our brains as before. We shrink, rightly enough, from being shelved just when the rewards of our exertions are becoming due; and we do not care to rival the centuries of the olive or the yew, unless we can, like them, 'renew our age' and bear fruit unto the end. Here, then, alcohol steps in as a help in need, and it is strictly in accordance with the teachings of physiology to increase, as years increase upon us, the moderate quantity we had been

taking previously. I do not write for habitual revellers and muzzy dram-drinkers (the sooner they become teetotallers the longer they will live), but for the temperate users of natural good things, and I am sure that they may reasonably obey the instinctive desire to take more and stronger wine as they grow in years.

The physiologist Moleschott, moreover, states that 'a glass or two of good old wine augments the amount of gastric juice, the liquid which performs mainly the digestion of albuminous aliments.'[1] So that here we find another reason for indulging the instinct.

Elderly people are able to do with less sleep than younkers, and need not be alarmed at a certain shortening of their night's rest which is natural. But sometimes the shortening goes too far, even in health; they cannot get to sleep for a long time after going to bed, and are worn out with restlessness and rolling about—not to mention that they disturb others also in many instances. This inconvenience may often be obviated by having an egg, a sandwich, a few biscuits or other light repast the last thing, accompanied by a glass of bitter ale, or sound wine and water. Sweet, strong wines are those usually recommended for this purpose: Hufeland recommends Malaga; and Burgundy or Port, warmed, spiced, diluted, and sweetened, is not a bad drink; but probably the best for each individual is that which association or whim makes most agreeable to the palate. Some prefer gruel or arrowroot to be the vehicle of the alcohol, and it certainly dilates and distributes the virtues of the draught efficaciously, and also warms up the stomach comfortably; but it has a coddling invalidish look which should be avoided.

Dr. Welsted considers that it contributes to length of days to associate as much as possible with young people, and to adopt such habits and manners as may attract rather than repel them, to which last there is a temptation in old age. And, of the young people, he holds, that the best companions

[1] *Kreislauf des Lebens*, letter 6.

are those whose spirits are high and joyous, and whom we can induce to rally round and infect us with their life. 'For,' as he says, 'that solitude which is associated with fear and sorrow breaks up the strength of both mind and body.'

It is almost needless to say that ease of mind, contentment with the present, and calm confidence in a future happy renewal of the worn-out body and soul, are specifics suitable for all cases. It is not hard work that kills the active, nor idleness that kills the man of leisure, be he old or young, but worry. 'Be careful for nothing, the Lord is at hand' is a motto which will prolong the lives of all.

CHAPTER XI.

ALCOHOL.

§ 1. Physical Effects.

Many a man has asked himself, like Horace, 'Quo me, Bacche, rapis Tui plenum?' To what does the natural thirst for alcohol lead? He sees around him disease, death, and misery directly traceable to the abuse; but he sees also disease, death, and misery, arising from the abuse of other instinctive desires which it were profane to call evil. Is there a use? What happens to a temperate consumer, likely to shorten or prolong his days? Or does he merely gain a pleasure without any consequent good or evil?

It was with a view of getting a basis for the satisfaction of my mind on these points that about fifteen years ago I engaged a laboratory assistant, and carried on the following experiments:—

Experiment I.—A. M. aged 38, weight 254 lbs.—taken at noon every day—Habits of life extremely regular. He walks half an hour before breakfast daily, breakfasts at eight on two cups of coffee, bread and butter, and a slice of cold meat: dines at one on beef and mutton in regular quantity, potatoes and pudding; has tea at five, two cups with bread and butter; sups at nine on bread and butter, or cheese, with half a pint of ale. He sleeps six and a half to seven hours. His bowels are open once daily. An idea of the normal amount of metamorphosis in his body is afforded by the following table:

	Quantity in cubic centimetres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes	Uric acid in grammes
Amount of urine and its several parts made in 23 days, in perfect health and on usual diet . .	24·970	1·022	728·437	174·625	51·307	44·719	—
Ditto in 15 days[1]	—	—	—	—	—	—	2·813
Mean daily amount . }	1·085	1·022	31·671	7·592	2·230	1·944	·187

The effect of the addition of a certain quantity of alcohol to the daily meal is shown by the next table:

Date	Quantity in cubic centimetres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes	Uric acid in grammes	Daily quantity of best French brandy, added to meals in ozs. by measure
Sep. 13	1,020	1·024	30·708	7·140	2·017	1·469	—	4½
,, 14	1,570	1·022	39·746	10·990	2·579	·848	—	3
,, 19	1,050	1·026	38·795	8·400	2·456	1·800	—	6, viz., 1½ at breakfast, dinner, tea and supper.
,, 20	1,200	1·025	42·695	9·600	2·622	1·944	—	
,, 21	1,110	1·023	37·974	6·937	2·212	1·798	—	
,, 22	770	1·026	30·030	6·160	2·065	1·386	—	

On September 23, the appetite for food was observed to be somewhat less than usual, and the experiment accordingly ceased; for any change of usual weight, health, feeling, or habits, of course would vitiate the result of an investigation conducted in this form.

Here are shown the effects of mixing with the daily meals such an extra quantity of alcoholic liquid as is very usual with moderate consumers. Such a quantity seems to put them at ease with themselves and with the world around, without causing any immediate injury to the general health, any untoward exhilaration or any subsequent depression.

[1] On eight days the uric acid was not weighed.

We may observe :—

1. *The aqueous part of the urine daily excreted is not increased beyond the extent of the extra fluid injected.*

2. *The quantity of urea is increased after the first twenty-four hours.*

3. *The chloride of sodium and the sulphates are slightly increased.*

4. *The phosphates are diminished.*

5. *The augmentation is temporary, and after a time is succeeded by a reduction to the normal measure, which reduction is coincident with a loss of appetite.*

Alcohol, then, is not a diuretic in the commonly received acceptation of the term, and the repute which it has got of belonging to that class of medicines, must be due to some other ingredient of the compound forms in which it is usually swallowed, or to its relieving (in certain cases of diminished excretion) impediments to the due action of the kidneys.

At the same time there is represented by the increased formation of urea, a more active destructive assimilation, and (in as much as the weight of the whole body is not lost) a more active reconstruction of the nitrogenous elements of the tissues. Old flesh is removed, and meat food is appropriated as new flesh, somewhat quicker than when no alcohol is taken.

It is a matter of common observation that the appetite of an average healthy man has a keener edge put to it by a moderate quantity of beer or wine with meals. So that the above-mentioned enhancement of the interstitial growth may be fairly credited to a temporary rise of the digestive powers of the stomach.

The decrease in the excretion of phosphorus is small indeed but indubitable. The chief source of that ingredient of the urine may be reasonably supposed to be the substance of the brain and nerves, and it can hardly be thought a mere coincidence when a re-agent whose effects are most peculiarly manifest on the functions of those organs, diminishes what

we believe to be the result of their chemical changes. Everyone recognises in alcohol a power of blunting sorrow and pain, of checking the sensation of weariness, mental or bodily, of rendering carnal love coarser, less keen, and less discriminating, taking the points off the stings and buffets, discomforts and nastiness of daily life, but also of corrupting the delicate appreciation of its higher delights, in short, of diminishing the sensibility to impressions in mind and body, of lowering the receptive functions of the nervous system.

In a series of experiments conducted for another object, Dr. Edward Smith has recorded minutely the sensations experienced by a healthy man on taking moderate quantities of brandy.[1] They consist essentially of lessened consciousness, lessened sensibility to light, to sound, to touch. The higher the sensibility of the part under ordinary circumstances, the more obvious its anæsthesia under the influence of brandy. For instance, there was in the upper lip and cheeks a feeling of stiffness and puffishness, which is one of the first symptoms of lowered sensation, and is familiar to all in cases of partial paralysis. The dartos also and other muscles connected with the reproductive system were relaxed; as was also the sphincter of the bladder, accounting for the increased micturition during indulgence. The pulse also was quickened, a phenomenon which always attends temporary debility of the heart's action. Indeed, in all motion of a purely involuntary character, quickness always indicates diminished muscular force. (The same result follows tobacco smoking.) The sensation of swelling in the upper lip is the premonitory stage of the muddy flush by which the artist and the actor mark the face of the 'fuddled' man (*ebriolus*). When he is completely intoxicated (*ebrius*), it is oftener pale or livid. The venous congestion and arrested circulation is then transferred to the capillaries of the cerebellum, (Flourens[2]), and stomach (Brodie[3]), and a

[1] *Transactions of Royal Society*, 1859, p. 732.

[2] *Recherches sur les fonctions du système nerveux*, Paris, 1824.

[3] *Philosophical Transactions*, 1811.

secondary series of phenomena follow, dependent upon the local affection of these organs. There is a staggering gait, a want of co-ordination in the movements, and often vomiting.

Life and warmth are so closely connected together in scientific as well as in popular notions, that perhaps the most striking evidence of diminished vitality is the lessened capability to generate heat. And we have this evidence in the case of alcohol. MM. Dumeril and Demarquay published in 1848 their observation, that intoxicated dogs exhibited a great loss of temperature; and Dr. Boecker [1] and Dr. Hammond find in their own persons the same result from even moderate doses of spirits. This accords with and explains the experience of Dr. Rae, that alcoholic drinks give no satisfaction to Arctic voyagers, and of Dr. Hayes (Surgeon and Commander in U.S. second Grinnell Expedition), that they actually lessen the power of resisting cold.[2] The 'warming of the stomach' which dram-drinkers speak of with such gusto is, in fact, a fallacious sensation arising out of insensibility to external influences.

When the poisoning is still more profound, the congestion of the nervous centres produces complete apoplexy, and that of the stomach, gastritis. The traces of these morbid conditions are found after death, but the loss of life seems due to the paralysis of the respiratory muscles and the lowered temperature of the body. I am unwilling to enlarge further upon dead drunkenness and fatal alcoholic poisoning, as I have no personal observations on the subject to record, and their commonly reported characteristics are repeated here principally to show their essential agreement in physiological nature with the healthful and beneficial, or, at all events, not pernicious action of the substance. The effects in a healthy man would seem to be the diminution of the energizing wear of the nervous system, especially that employed in emotion and sensation. Thence there ensues a raising of the digestive

[1] *Beiträge zur Heilkunde*, i. 250.

[2] *American Journal of the Medical Sciences*, 1859, p. 117.

powers and appetite, should they have been anywise unconsciously blunted by the psychical movements above mentioned. Just as often, then, as the zest for food is so far lowered, that it is found to be raised to the normal standard by a little wine or beer with a meal, the moderate drinker is as much really better, as he feels the better, for his liquor. In cases, however, where the food is as keenly enjoyed without the aid of any of the products of fermentation, their consumption is certainly useless, and possibly injurious. So long as alcohol, in the indirect mode mentioned, augments vital metamorphosis, it ministers to the force of the body. But it is not a source of force, and its direct action is an arrest of vitality. This should be clearly understood by all those who try to have rational rules to guide them in proffering advice as to the dietetic use of a 'stimulant.' That word means a 'spur,' and inasmuch as a spur is employed either before or during the exertion it is supposed to bear upon, liquor is often resorted to as a means of invigorating a temporary effort. If it has any effect at all on a healthy man, it can but weaken nerve power, while at the same time it lowers the bodily temperature which contributes much to the capacity for muscular exertion. Instinct or experience has taught this to men whom we are pleased to call barbarous. The Indian porters in South America (it is stated by Mr. Salvin, the ornithologist), when they prepare for a stiff journey under one of their heavy loads, carefully eschew all strong drink, and swallow large quantities of water as hot as the stomach will bear. And Aristotle states that the Carthaginians (the only African race ever fit to fight with Europeans) used when out on military service to abstain from wine.[1] The unhappy adoption of the word 'stimulant' has

[1] Aristotle, *Œconom.* i. 5. I have not seen this statement alluded to by historians, though it seems to account for the enormous quantity of vinegar which Livy found no difficulty in believing Hannibal had in his commissariat and used for decomposing Alpine rocks (Liv. xxi. 37). It was made tasty with pears (*Pallad. in Februar.* xxv. 11), and employed to flavour the soldiers' drinking water.

demoralised the notions of civilised communities on this head, and led them to reckon on priming themselves up to unwonted strength with anæsthetics. Let them rather say with Byron's Sardanapalus, 'The goblet I reserve for hours of love, But war on water,' and victory will be much surer. There is, however, another aspect to the question. Man must be viewed not only as a possible victor, but as liable to the reverse fortune, on the battle-field or in the struggles of life. Both sides cannot win. During the Crimean war the Russian surgeons were reviled for serving out spirits to their troops under fire; but were they not wise to calculate the after consequences of an engagement, and to prepare the bodies of their clients for successfully bearing blows and wounds? 'They have stricken me and I knew it not,' says Solomon's drunkard; and our accident ward at Christmas time will seldom fail to show proof of the power to resist severe injuries conferred by unwonted indulgence in the joys of Bacchus. A healthy man who gets the worst of it in any way, whose intellectual or muscular energy goes down under the pressure of the work demanded, gets the worst of it in a less degree by the aid of strong drink. Give it him when ready to perish from the drain on his nerve tissues, and his life is saved. The labourer whose limbs are stiff with his day's toil, and the brain-worker who still more acutely feels the wear and tear of bread winning, are not wasting the money they earn, which they spend on a fair ration of beer or wine at their evening meal. But if they take spirits of a morning (it is usually spirits which are then taken), never let them hope for the success in the undertakings for which they seemed designed. Both body and mind will be incapacitated, the life shortened, and all the keenest joys taken out of what remains. One of the most telling questions that can be asked of a life proposed for insurance is, 'Do you ever take spirituous liquors in the forenoon?' If the answer is in the affirmative, an immediate rejection is the only safe course for the office. As to small quantities of beer or wine that are consumed between breakfast

and the midday meal, the evidence against it is not quite so decisive, but, at all events, it renders a man less fit for his daily work than he would otherwise be, and is a dangerous downward movement towards the abyss of dram-drinking. It will generally be found to have been the first fatal step in the cases of women of the upper classes who have adopted the practice. And, to the shame of our profession, it must be confessed that many of us have erred most unhappily by recommending or sanctioning the habit in weakly or self-indulgent women. The weaker they are in body or mind, the more helpless they are, and the more hysterical, the more reason there is for withholding the temptation. We must be proof against tears and sighs, blandishments, entreaties, and reproaches, or we are not fit to bear the rod of Æsculapius.

See what happens if, instead of being drunk with the meals, alcohol is taken in small divided doses :—

Experiment II.—The same man described in Experiment I. at another time consumed daily, between 9 A.M. and 9 P.M., six ounces of brandy in doses of half an ounce every hour. No effect was produced on the general health and feelings, and the usual employments were followed except on the last day of the experiment, when M—— was bustling about in a great state of excitement, packing up to leave for a country holiday.

The analysis of the urine was as follows :—

Date	Quantity in cubic centimètres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes	Uric acid in grammes
August 18 . .	1,520	1·013	30·465	5·320	2·210	1·299	·008
„ 20 . .	910	1·025	33·077	6·370	2·375	1·474	·259
„ 21 . .	1,070	1·022	32·945	6·687	2·246	1·637	·193
„ 22 . .	1,000	1·021	23·735	6·750	1·897	1·440	·135
„ 23 . .	1,310	1·015	25·097	7·205	1·649	1·061	·196
„ 24 . .	1,530	1·021	41·867	9·945	3·064	2·203	·390

One day was an interval in the experiment, and only the usual amount of daily diet, without extra alcohol, was taken, when the numbers stand as follows :—

Date	Quantity in cubic centimètres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes	Uric acid in grammes
August 19 . .	920	1·026	35·88	5·750	2·374	1·904	·281

It is very clear from these observations that alcohol taken in the dram-drinking fashion—namely, in small divided doses—by no means increases metamorphosis. It rather tends to diminish it, so that during the first five days quoted the mean quantity of urea excreted is 29·063 instead of 31·671 grammes. And this diminution is not sudden or immediate, but is more and more for a certain period, till the retention reaches a point at which a critical evacuation takes place in healthy persons.

This evacuation may take place in consequence of the alcohol being left off, as may be observed on the day of interval. Or again it may result from increased exertions and unwonted expenditure of nervous energy, as may be noticed in the last day of the experiment. In neither case does the amount, even of the urea, replace the amount arrested during the days of arrest; and the phosphates are still less unable to make up their lost figures in the ledger.

It cannot be concealed then, that even without at all infringing on high health, alcohol in small divided doses and between meals, dram-drinker's fashion, deranges the metamorphosis of the tissues, and in the direction of arrest. And persistence in the habit must lead in the end to permanently diminished organisation, degeneration, atrophy. Just as a disused limb wastes away, so must the unrenewed tissues die off gradually, till they become unequal to the support of a healthy man's existence.

The first action of alcohol, then, is on the stomach, enabling more food to be digested, and enhancing the origination of force. But if advantage be not taken of this first

action, its secondary effect is a diminution of the vital functions in general and of digestion among their number.

It might be suggested that the subject of the experiments was so little used to stimulants that an abnormal effect might be produced upon him by them, but that is rendered unlikely by the succeeding observation on a person whose habits may be described as closely verging on 'full living':—

Experiment III.—C—— aged 43, healthy, though not muscularly robust, of regular life and habits, took daily during the days named in the table a quantity of food proportioned to appetite, viz., about a pound and a half of meat, half a pound of bread, a pint and a half of tea, with milk, sugar, butter, sauces, &c., *q. s.*, half a pint of water, and from five to seven glasses of port or sherry,[1] care being always taken not to annoy the temper, and so nullify the experiments, by overstrictness.

	Quantity in cubic centimètres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes	Uric acid in grammes
Amount of urine and of its several parts, made in 15 days in perfect health and on usual diet . .	18,800	1·022	493·852	137·655	—	—	—
Ditto in 14 days[2]	—	—	—	—	26·487	27·683	3·839
Mean daily amount .	1,253	1·022	32·923	9·177	1·891	1·977	·274

The effect of taking in addition, between meals, a moderate quantity of alcohol in divided doses, is shown in the following table:—

[1] Which may be reckoned to contain from 33 to 35 per cent. of proof spirit.

[2] Of one day the record was imperfect, the sulphuric acid, phosphoric acid, and uric acid not having been weighed.

Date	Quantity in cubic centimètres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes	Uric acid in grammes	Daily quantity of best French brandy taken between meals
Nov. 16	1,180	1·021	30·090	11·210	1·954	1·770	trace	3½ fld. ozs.
„ 19	1,800	1·013	28·854	9·900	1·906	1·800	·258	8 „
„ 22	1,150	1·025	32·775	12·075	—	—	—	7½ „
„ 23	980	1·025	27·930	9·310	—	—	—	7½ „
Dec. 3	1,060	1·023	28·620	9·540	1·785	1·696	·339	3 „
„ 5	1,320	1·019	30·875	9·900	1·865	1·980	·330	8 „
„ 6	1,110	1·021	30·025	9·435	1·713	1·665	·299	8 „
„ 17	1,180	1·020	30·208	9·440	1·586	1·652	·343	4 „

It is very clear from these figures that vital metamorphosis, as evidenced by the amount of the principal solids of the urine, is diminished by thus taking more alcohol than the healthy instinct prompts, even in a person used to the full quantity that temperance permits. Not only are the whole mean amounts low, but on no day do they come up to the average. The only exceptions are the chloride of sodium, which is slightly increased, by what agency I cannot tell, and the uric acid, whose augmentation is, probably with justice, considered an indication of an approaching abnormal state. It may be remarked that a greater quantity of brandy than that recorded above spoiled the appetite and prevented the usual diet being taken with pleasure. I considered that this would nullify the experiments as representing the effects of alcohol in health, for it placed the body in an abnormal state, and I therefore discontinued them for a time.

The only marked effect of the quantity taken on the full days, was a certain degree of insensibility of the facial skin to changes of temperature; the fire did not scorch, and the east wind did not chill. So that probably some temporary power of resistance to external influences was gained, to be followed by reactionary sensitiveness.

Let us observe now the effects of spirituous liquors taken in great excess, namely in quantity sufficient to destroy the natural sensitiveness to mental emotion:—

Experiment IV.—Letitia ——, a healthy prostitute aged 23, acquired the habit, during a year of her being on the town, of frequent tippling to drown care. Standing by her bed at home on August 14, she suddenly fell on it, not losing her senses, but having complete paralysis

of the right leg and arm, without a fit. On her admission to a hospital two days afterwards, the power had returned in a great measure to the limbs, but the right lingual and facial muscles were still quite paralytic. As far as one could judge by external phenomena, all the viscera except the brain were in a healthy state, and she showed no signs of hysterics. She stayed in the hospital till September 6, when she was offered a place as servant, and a slight impediment to speech remaining I considered not sufficient reason for her passing over so good a chance of bettering her social state. During the time she was under observation no drugs were prescribed for her; she lay on her bed the greater part of the day, and sauntered about the ward and garden the rest; she was kept on broth diet,[1] and on and after August 30, three ounces of brandy were allowed daily. The amount of urine and of its chief constituents excreted by her on all the days when circumstances allowed it to be all collected, is shown in this table:—

Date	Quantity in cubic centimètres	Specific gravity	Urea in grammes	Chloride of sodium in grammes	Sulphuric acid in grammes	Phosphoric acid in grammes
August 17 .	252	1·018	5·915	1·389	?	·409
,, 19 .	880	1·006	12·729	4·400	?	·396
,, 20 .	240	1·014	4·529	2·040	?	none
,, 21 .	270	1·007	3·429	·337	·206	·061
,, 22 .	360	1·011	5·280	2·340	·212	a trace
,, 23 .	1,000	1·007	15·353	3·500	·871	·540
,, 24 .	1,280	1·007	14·504	4·480	·715	a trace
,, 27 .	570	1·008	9·405	1·425	·436	a trace
,, 28 .	1,030	1·007	10·979	3·862	·596	·404
,, 29 .	730	1·010	9·252	3·285	·423	a trace
,, 30 .	1,320	1·008	13·645	5·120	1·039	?
Sept. 1 .	—	—	—	—	—	—
,, 2 .	1,650	1·008	22·027	1·358	7·425[2]	?
,, 3 .	—	—	—	—	—	—
,, 4 .	—	—	—	—	—	—
,, 5 .	900	1·010	13·231	2·925	·790	·162

The metamorphic organs of this girl were clearly in a most perilous condition. So little phosphorus was excreted

[1] Tea, 2 pints, with 3 ozs. of milk, and sugar *q.s.* Bread, 12 ozs.; butter, ¾ oz.; broth, 1 pint with 4 ozs. of boiled meat; gruel, 1 pint.

[2] There was a suspicion that on this day the patient had surreptitiously taken a dose of Epsom salts. On the next two days the catamenia were present for a short time as in anæmic women.

that the nervous system can have been hardly renewed at all. Sometimes not more than a tenth, generally about a third, and occasionally half, of the due proportion of urea appeared in the urine. When as much as half of the proper quantity of urea was formed, there was an extraordinary gush of the aqueous constituent accompanying it. But at other times the total bulk of the renal discharge was very deficient. The habits of the urinary department in the patient's economy closely approach to those which we find in that peculiar metamorphic (or functional) disease of the nervous system, the various symptoms of which we roughly class as 'hysteria.' If her family had been cursed with the *damnosa hereditas* of that disease, she would most probably now have developed it. Sydenham shrewdly observes that if there is any difficulty in coming to the diagnosis between hysteria and other possible causes of ailment in a particular case, two questions answered affirmatively are enough to decide in favour of the former, viz. 'Do weariness and worry especially excite the symptoms?' and 'Does the patient make sometimes an unusual quantity of pale urine?'[1]—an instance thus of how

> Old experience doth attain
> To something of prophetic vein;

for those are the very hooks on which the most advanced science of the present day would hang all the pathology of hysteria. For it holds it to be—1. A disease of the nervous system; 2. A disease of an exhausted nervous system; and, 3. A disease in which an exhausted nervous system fails to complete the evacuation of the *débris* of metamorphosis—the very points made in Sydenham's aid to diagnosis.

In the following instance alcohol, acting on a predisposed person, produced marked hysteria, and was identified as the guilty agent by the disease ceasing on its being left off:—A clergyman's wife, of a refined sensitive nature, became subject to attacks of nervous sobbing and depression of spirits,

[1] Sydenham, *Dissert. Epistol. de Affectione Hystericâ*, sec. 78.

especially during changeable weather. She also frequently vomited her food immediately it was swallowed, and at last entirely lost the tone of her voice, being unable to speak above a whisper when under the excitement of a consultation with her physician; but yet she had a brazen-faced repellent kind of manner which sat very oddly on a really modest Christian lady. Long and ingeniously did she elude the discovery that she was given to secret dram-drinking, but was at last persuaded to place herself under the care of a kind Quaker couple, who saw that she had no intoxicating liquor for two months. All the aphonia, vomiting, and other hysterical symptoms went away during this time, and it is believed have not returned. Such is the most usual effect produced on a woman, previously healthy, by frequent small doses of alcohol. She becomes hysterical; but rarely does she get delirium tremens from it alone. That form of nervous tornado attacks the female sex only in old age, when the feminine characteristics are annulled, or in consequence of intense mental excitement. But when it does attack them, they are very apt to sink under it. (As *e.g.* an upper housemaid at a large hotel, falsely accused of theft, died under my care at St. Mary's in two days of furious delirium tremens. Her boxes were filled with empty brandy bottles, though she had never shown signs of drinking.) In man delirium tremens is much more readily induced, and hysteria only exceptionally. It is not necessary to do more than allude to the well-known deficiency of both the watery constituent and the phosphatic salts of the renal secretion in these cases during the violence of the disorder, as that point has been ably illustrated by Dr. Bence Jones in his paper on the subject.[1] But it is worth while to draw attention to the fact, that exactly contemporaneous with a restoration of health is the reappearance in the urine of the phosphates in his third case. It is possible that the delirium may be a clearing storm, the consequence of which is a return to the normal

[1] *Med. Chir. Transactions*, vol. xxx. p. 21.

state of phosphatic metamorphosis sooner than happens in cases where the delirium does not occur. For it may be observed in Experiment III. in this chapter, where there was no critical paroxysm, that the phosphates remain almost wholly absent from the analysis, in spite of apparently recovered health. And this accords with the familiar fact that hysteria is a much more obstinate disease than paroxysmal alcoholism.

Allusion has been made to the use of alcohol as a protection, in cases of traumatic injury and mental exhaustion, against the pernicious over-activity of the nervous system. And it is possible, too, that it may oppose the entrance of morbid and other poisons by retarding absorption, as is indicated in its popular reputation as a preservative against malaria and noxious fumes. But if it has failed in its mission, if the wound, or the worry, or the virus have been too strong for their force to be broken by such a buffer, then there seems some doubt whether the patient is, or is not, worse off for having taken it. Just as after an operation under anæsthetics there may in some cases be a similar doubt. But an habitual tippler, as distinguished from an occasional exceeder, is certainly in more danger from disease than a temperate man under the same circumstances. The venerable Dr. Christison, in a letter dated 1870, writes :—'How can we ever hope to express numerically the influence of drunkenness (habitual) in aggravating the mortality from fevers, cholera, dysentery, and other zymotics? . . . . Let me conclude with one illustrative fact. I have had a fearful amount of experience of continued fever in our infirmary during many an epidemic, and in all my experience I have only once known an intemperate man of forty or upwards recover. He was the *exceptio quæ prŏbat regulam.*'[1]

The action of alcoholic drinks upon the internal viscera seems to be an immediate, and if continued, an habitual paralysis of the vaso-motor nerves; as may be seen by the

[1] *Second Annual Report of the State Board of Health of Massachusetts*, Jan. 1871, p. 339.

naked eye in the flushed face of the drunkard. Venous congestion follows, and the glandular structure becomes loaded with black devitalised blood. The presence also of the alcohol in the blood further diminishes the rapidity of nutrition and disintegration, and consequently diminishes the dependent functions of elimination and calorification, and as long as it remains in the body.[1]

Secretion is retarded, and the organic material which ought to form it, grows into a semi-organic morbid tissue, bloodless, insensitive, useless, which we call *cirrhosis*. This gradually dries up and shrinks, like a scar, and thus puckers up the gland it is in, forming 'nutmeg' liver, 'granular' kidney, 'fibrosis' and 'chronic condensation' of lung, thickening of the mucous membranes in larynx and elsewhere, and arterial degeneration.

In the case of the liver no pathologists ever seem to have expressed a doubt as to the influence of alcohol upon it; but in regard to the kidneys there has been a controversy as to whether the prevalence of Bright's disease among the working classes should not rather be attributed to their exposure to weather: and Dr. Dickinson, of St. George's Hospital, has contributed somewhat to relieve alcohol of exclusive responsibility. He compares numerically the frequency of renal degeneration in the bodies of a class especially open to the temptation of excess—consisting of pot-boys, publicans, spirit-dealers, cellarmen, waiters, &c.—with what was found by post-mortem examination in an equal number of other hospital patients of various occupations. The kidneys were reported free from disease in almost exactly the same number of the two classes.[2] Now the principal flaw in this argument is that many of those whose trade is among spirits are nevertheless very temperate persons, (my own wine merchant takes only a glass of

[1] Dr. U. S. Davis, in the *Chicago Medical Examiner*, Sept. 1867, brings evidence from sphygmographic observations as to the depressing influence of alcohol upon the circulation.

[2] *Med. Chir. Transactions*, vol. lvi. p. 51 (1873).

currant wine with his dinner); and 'barmaids' and 'waiters,' included in the black list, are only exceptionally intemperate. And we must add to this that several of the employments of the other class are really more likely to lead to tippling than the trade in alcohol is. (Who, for example, ever knew a 'traveller' who was not obliged to liquor with his customers, as part of his daily work?) Dr. Dickinson rightly points out that the non-alcoholic class are much more exposed to the weather than the others, and this noxious influence, balancing to an unknown degree the influence of alcohol, vitiates the value of the statistics. The only fairly reckoned non-alcoholic persons are total abstainers, who now are to be found in considerable numbers, and might be compared justly with the rest of the population. While I think Dr. Dickinson to be right in his general conclusions, as also in attributing greater importance than some others do to climatic influences in renal degeneration, I do not consider that his statistics bear him out. They are too raw. At present, it seems to me that the physiological knowledge which we possess of the influence of alcohol in health is a more accurate guide to its morbid consequences than any statistics yet put before the world. It is impossible to trust a patient's statement as to drinking habits, and there is no other attainable datum for classifying him as temperate or the reverse.

The 'chronic condensation' of the lung induced by alcohol, seems to be a form of atrophy not dissimilar to that brought on by the presence of fluid in the pleura, emphysema or frequent bronchitis. It arises from the imperfect functioning of the lung tissue, which, like all imperfectly functioning tissues, becomes less vitalised, less fully renewed by interstitial metamorphosis.

This imperfect functioning is a necessary consequence of the limitation of the aërating area of the lungs by the sanguineous congestion which has been already alluded to. The extent to which the habitual congestion of the tissue and limitation of area is carried, even without apparent injury to

health, is proved by the diminution of the 'vital capacity' for air as shown by the spirometer; no drinker of drams between meals can ever come nearer than 20 or 30 cubic inches to the amount of air the lungs ought to expire in health. Yet so little does he notice this shortening of wind, that it is no uncommon thing at insurance offices (when they use the spirometer) to have proposers make their appearance stating that they have never been seriously ill, and never felt better than at that moment, who are caught out as dram-drinkers by the failure at the spirometer. The partial condensation of the lung from this cause is not so likely to lead to fibrosis as to inelasticity and fatty degeneration of the tissue. The surface of the organ when examined *post mortem* takes the mark of the finger pressed upon it, is saturated with moisture, hardly crepitant at all and hardly able to swim in water. But it does not, as a rule, exhibit the whitish gristly stripes, which squeak under the scalpel, and consist of a dense fibrinous substance, nor the contracting scar-like depressions which characterise chronic pneumonia. Nor does it suppurate, I believe.

The chronic condensation of the pulmonary tissue is partly the cause of the wheezy broken speech of the intemperate; but this also depends very often on an irregularly thickened condition of the laryngeal and tracheal mucous membrane, following an habitual sluggish circulation through its capillaries.

The last-named injury to health from excess in alcohol, arterial degeneration, is perhaps the most doubtful. It is so common in all classes that it is very difficult to arrive at direct proof of the tendency to it being increased by this cause. The principal fact in evidence is that it is more common among men than among women, and so is also drinking. But when I review the physiological instead of the statistical aspect of the argument, I can hardly hesitate to assign a serious influence in the induction of the lesion to alcohol. Alcohol, which lowers all the vital actions we know of, is just the agency one would think most pernicious, in replacing elastic and fibrous

tissue by that of an inferior grade, friable and unorganised. Under arterial degeneration there ranks itself a long list of evils, of which those best known by name to the public are apoplexy and dropsy, justly reputed to be due to drink. To the medical mind they naturally suggest themselves, and it is needless to enumerate them here.

When we consider how completely the whole body is saturated by alcohol taken in any marked excess, we cannot be surprised to hear that the evil effects of it are not rarely transmitted to future generations. In a recent work,[1] Dr. Auguste Voisin has published the results of an investigation into the consequences to the children of the father's addiction to intoxication, and very terrible they are. In seventeen cases of the spark of life being struck during the drunkenness of the father, infantile convulsions caused the child's death in eleven. Less fortunate were those who survived; three were idiots, two were epileptic, and one the subject of chronic myelitis. Of course this list is not a full statistical representation of the consequences of the parents' excess, for those who escape do not become subject to medical examination, and there is no means of knowing how many they may be. But it is a very terrible list for all that.

Chronic alcoholism in the parents is still more cursed than the action of the acute condition above alluded to; for it does not cut off the victims by a sudden blow, but allows them to live on in indefinite wretchedness. Of eighteen cases traced by Dr. Voisin, eight were idiots and ten were epileptic.

Having attributed so many ill effects to alcohol, it is but fair to enquire whether something may not be found as a set-off beyond the mere dietetic use mentioned at the beginning of the essay. If it causes disease, may it not also prevent? There is a prevalent notion that it excludes the formation of tubercle. The fact given in proof of the notion is that publicans do not often die of phthisis, and Dr. Walshe en-

[1] *L'Alcoolisme et la Séquestration des Aliénés*, p. 3.

dorses the truth of it.[1] My own limited experience certainly confirms that observation, but yet it goes rather to show that their not dying of phthisis depends, not on the exclusion of tubercle, but on the postponement of the second stage of the malady. The tubercles do not so soon break down into suppuration. A publican who was a patient of mine for several years, off and on, died of hereditary consumption at a much later period than the rest of his family, and indeed after he had ceased to be a publican; but the first development took place while he was actively engaged in aiding the spirit-trade by precept and example. Nevertheless, it is something gained if the softening of the tubercles is in any way arrested by the use of alcohol, even though the arrest should be followed by a more general break-up in the end. But the use of alcohol in the treatment of disease, as contra-distinguished from its prevention, belongs to the next section, where the subject shall be resumed.

The dietetic use of small quantities of alcohol tends to ward off morbid conditions which are secondary upon atonic dyspepsia; and therefore it may be credited with the prevention of anæmia, emaciation, premature old age from worry, melancholia, sleeplessness, and any other possible consequences of that form of indigestion in a considerable section of the population. Our weaker brethren (γάστερες ἄργοι, 'slow stomachs,' as the poet with anatomical precision calls them) owe it to alcohol, and often to alcohol only, that their weakness does not become disease. Very likely the *dura messorum ilia* are better without it, so long as they continue tough; but how long is that in this age of feverish cultivation of the soul at the expense of the body? And ill indeed can the world spare many of those weaker brethren, who without alcohol would be wailing invalids instead of the pillars of the country.

The form in which the product of alcoholic fermentation

[1] *Diseases of the Lungs*, 4th. ed. p. 453.

is presented to the digestive organs is far from being indifferent. The various methods of making it agreeable, or convenient, or cheap, offer an article varying from one little distant from a poison to one where all the advantages are obtained with an inappreciable risk of disadvantage. The most wholesome of these beverages are the immediate results of fermentation in its simple integrity, or with the addition of water only. But it is very seldom that the saccharine matters used are good enough, or the makers skilful enough, and honest enough, so to manufacture their liquors as to be agreeable to the palate, or capable of remaining agreeable for a sufficient time. And, therefore, the pure but nasty liquor has to be distilled; and the distillation partly concentrates, but principally newly developes the noxious 'fusel oil,' the bugbear of the distillers. All new, and therefore all cheap, spirits are made by it nauseous to the unaccustomed palate, and deleterious to the health.

Of pure wine the ripening is soon effected, and after a year or so, the palate only has to be consulted as to the time of consumption. But it is not so with vintages whose peculiar flavours it is desirable to preserve by retaining unfermented a portion of the sugar, and the oil of the grape-stone. Unless these wines are 'fortified' with spirit, they decay prematurely, grow mouldy or 'bitter,' rancid, and sour. Now, if pure alcohol or old French brandy were used for this purpose, little harm would be done, but the manufacturers commonly employ for cheapness new potato or corn spirit, loaded with fusel oil; and then the only chance for the consumer getting a wholesome beverage is to keep it at the risk of deterioration, till it has become a costly luxury. Woe to the drinkers of cheap Peninsular wines and their imitations.

There has been some question lately as to how 'purity' in wine is to be defined in legislative or other literature. Is it an adulteration to add alcohol to wine? I do not see how it can be considered so; and if it were, the proof of the addition of one of the normal constituents of the liquid would be difficult. Just as it is difficult to decide, except by a con-

ventional standard, that the water in our milk does not come from the cow. And conventional standards are not strict justice. But if the offence were held to consist in 'fuseling' wine, there would be but little impediment to our learning from an analyst whether we had an article fit for human consumption or not, and also its proximate commercial value.

What principally concerns us here is that not all the evil of strong drinks is to be attributed to alcohol; and that a man may by over-indulgence in 'pineapple lozenges,' 'pear drops,' or 'fruity hardbake,' made as usual with the products of the semi-decomposition of fusel oil, possibly do his health more harm than by visits to the tap-room.[1] The whole evil of drinking does not arise out of fusel oil; for we see the consumers of the very soundest beer and wine often suffer; but that an incalculable addition is made to it thereby is beyond doubt, and great gratitude is due to everyone that helps us to exclude it from our beverages.

There are also doubtless other qualities besides the exclusion of fusel oil which may render fermented liquors wholesome. Four years ago there was living at the village of Menidi, near Athens, a priest 90 years of age, who from early manhood had consumed a dozen bottles of Greek wine a day, partly at meals, and partly at odd times.[2] It would be interesting, no doubt, to know the structure of this venerable toper's kidneys, as specimens of typical development, but the consul is probably right in attributing much to the quality of the wine, which is preserved from chemical change by means of rosin instead of fusely spirit. Rosined wine *is* an acquired taste; and the British artist, when he first quenches his thirst

[1] In the *Fourth Annual Report of the State Board of Health of Massachusetts* (January 1873), mention is made by Dr. H. K. Oliver of two children being seized, after sucking a candy anchor, with alarming sedative symptoms, requiring active medical treatment. The flavouring was pine-apple essence (butyric ether).

[2] See a letter from the U.S. consul at Athens in the *Second Report of the State Board of Health of Massachusetts*, p. 258.

at a Tuscan farm or rustic inn, is apt to exclaim that the landlord has drawn the wine in a varnish-pot, and to sneer at the balsamic and wholesome *Vino Vermuth*. But it is a taste well worth acquiring by thirsty souls in warm climates, and to be patronised by philanthropists. I understand that the flavour of *Vino Vermuth* is partly given by wormwood; and if so, the acknowledged wholesomeness of the wine would seem an answer to M. Magnan and others who have been trying to fix upon the innocent herb the blame of what they call 'Absinthisme,' and which is stated to contribute so largely to the degeneracy of the French nation.[1]

Water, again, and salt are directly antagonistic to alcohol in their physical action on the animal body. They both, especially the former, augment metamorphosis, as the previously quoted researches of Dr. Boecker fully show. Their presence therefore in the wine, especially if they are thoroughly incorporated with it from its first origin, cannot but be beneficial. On this ground, the addition of sea water to the must (the marriage of Ampelos and Amphitrite of the Greek gem) is a custom to be highly commended.

Are there, against the ill consequences traceable to alcohol, any other preservatives, besides those found in the liquor itself?—any guardians, innate or acquired, resident in the body of the consumer?

There are probably few readers of British literature who have not smiled at Addison's light banter of the amateur self-doctor, who says he commits an excess on the first Monday in every month for the good of his health.[2] But perhaps all are not aware that this is a strict carrying out of the opinion deduced by the ingenious Sanctorius from careful observations made upon his own person. He says that 'They who use regular diet want the benefit of those who debauch once or twice a month.'[3]

[1] *Les diverses formes du dèlire alcoolique*, par le docteur Magnan. Paris, 1874: Delahaye.

[2] *Spectator*, No. 25.

[3] *Medicina Statica*, Aph. 100. Quincy's translation.

He does not give it as a popular notion, and it does not appear to have been so, till attention was drawn to his series of self-denying and generally conclusive experiments, with its portrait of the author dining in his scales opposite the title. But if the previous aphorisms be read, it will be seen that he grounds his opinion on the fact, that the weight of the body is less the next day 'without any sensible evacuation.'[1] This merely implies that less food has been assimilated, an advantage only to those who habitually eat too much. But the author seems to think that 'the corruptible body weigheth down the soul' in direct proportion to its pounds and ounces, a most unphilosophical superstition. All the possible benefit of the monthly debauch might be gained, in certainly a more dignified manner, by a day's fasting.

The only justification for an aphorism pregnant with so much danger is the observation, which is true enough, that occasional excesses, however much they may disturb the functions at the time, are infinitely less noxious than habitual dram-drinking. The most certain victims to alcohol are those who are always sipping, though 'never drunk in their lives;' whereas we have all of us known many a toper who has attained a green old age by letting an interval of recovery elapse between his bouts of riot.

A powerful collateral preservative is the kidney. If this organ acts well and quickly, above the average of human kidneys, a large proportion of the alcohol swallowed passes away unchanged and harmless in a short space of time, as is shown by the known researches of Dr. Percy, Mr. Masing, and the French physiologists, Perrin and Duroy, who have repeated their experiments. This peculiarity probably distinguishes those strange mortals who never seem the worse for anything they drink.

A further preservative against the wiles of alcohol is to be found in a full aëration of the blood. Those who can bear much liquor without constitutional effects have generally a

[1] *Medicina Statica*, Aph. 99.

high vital capacity of chest in proportion to their stature; whereas those whose health is injured by it fail to raise the spirometer to the proper measure of cubic inches; so that by this means constitutions damaged by drink can be detected at insurance offices. It may be observed also, that a free supply of fresh air during meals modifies considerably the results of imprudence.

§ 2. Moral Effects of Alcohol.

As man consists of mind as well as body, it is impossible in this essay to omit all mention of the moral effects of the consumption of alcoholic drinks, though the limitation of space prevents a full discussion of the subject. All nations that have led the van in the march of civilisation, have been addicted to drink—ay, and addicted to drunkenness. The Jews, the Greeks, the Romans, the Germans, the Swedes, the Danes, not to mention the English all round the globe, are amply attested by literature to have been distinguished above their contemporaries in this way.[1] It is true that some reactionary races, famous as conquerors, have been abstinent, but they and their faiths are dying out, and the colouring they have given to civilisation is even now fainter than that left by the robuster races a thousand years before they were heard of. Yet we learn at the same time from the same impartial witness, that vice, and vice too of a sort which is destructive to the social well-being of a community, is conspicuously traceable on a vast scale to strong drink. We read of it in patriarchal times as leading to a breach of the instinc-

[1] Dr. Bowditch contends that proneness to drunkenness is governed by climatic law, becoming stronger in proportion to distance from the equator. But as he allows of the influence of hereditary disposition, the law does not guide us to much inference. The widely dispersed races are not appreciably affected in their habits by isothermal lines. Facilities for growing the grape depend doubtless on climate, but I think Dr. Bowditch's own map and data exclude its influence on man in respect of alcohol.—*Third Annual Report to State Board of Health of Massachusetts.*

tive reverence due to parents, then to the vindictive cursing of a son, then to incest, then to murder, and so on in a continuous series up to the wife-beatings in yesterday's police reports.

Then, side by side with the innumerable judges' charges and prison reports, establishing irrefragably the fact that by far the greater proportion of crime brought under notice is due to drink, one reads with astonishment such unexpected revelations as those contained in the following letter from the United States consul at Copenhagen to the Massachusetts Board of Health. Mr. Yeaman says, after citing statistical evidence:—

'Here is a people evidently more prosperous than formerly, evidently using more brandy than formerly, and evidently less given to intoxication than formerly. . . The people here appear so very sober, that I have been simply astonished to find how much brandy they really use.' [1]

It is superfluous to notice that as intoxication is less, crimes of violence are less also.

Mr. Yeaman goes on to add:—

'There is perhaps no country in Europe, except Prussia, where the average standard of education and intelligence is so high as in Denmark.'

How shall this conflict be reconciled? How is it that ignorance, poverty, and vice, which daily are degrading the individual drinker, spare the community? Have the statisticians erred by collecting evidence only for the prosecution, and omitting a counterbalancing class to the criminals? I think so. The temperate man, who takes, in proportion to his needs, fermented liquors with his meals, has been put out of sight altogether. Yet is he the pillar of his country's prosperity, prolific, prosperous, and contented. It is probably his increase in number and power which balances the amount of vice and misery caused by excess in drink. It is not safe, then, for the political economist to neglect his interest, as would be done by legislative measures tending to make the

[1] *Second Annual Report*, 1871.

beverages he requires more difficult of attainment, by impediments to their purchase or the enhancement of their price. Still less is it safe by social pressure to lead him to banish the beer jug or the bottle from his table, and hide it in secret cupboards, or to drive him to sly-grog-shops between meals. He should rather be induced by the cheapness of wholesome fermented liquors to employ them for domestic use, and to forego the dangerous product of the still.

In Nineveh of old (as Mr. Smith reads to us from the arrow-head records) Ishtar, goddess of carnal love, behaved at one time so scandalously, that the reigning sovereign persuaded the heavenly powers to let him banish her to the nether world. Few that read the published translation in the *Daily Telegraph* last year (and who did not?) can forget the picturesque monotone in which her gradual decay into silence is narrated at solemn length. But no sooner was she put down, than matters essential to the future continuance of the race went all wrong, and the frightened mover of this early repressive bill was obliged to petition for her return; and back again she came in the same tedious way that she went. If this is history, it is a valuable experience; if it is a myth, a prescient knowledge of man's nature is shown, pregnant of warning to the legislator.

We need not hesitate to transfer to the regulation of matters connected with alcoholic excess experience amply confirmed by the history of all ages, derived from another cognate temptation. The crimes attendant on both are developments of selfishness, and of the want of that self-restraint which we were sent into the world to learn, and which a man may fairly complain of a so-called paternal legislation depriving him of the opportunity of learning.

But the removal of the means of excess, out of false tenderness to the exceeders, and at the expense of the temperate, is one thing, and the repression of their excesses is quite another —nay more, it is antagonistic. Pagan and Christian moralists have, perhaps, rightly held that of the three main incentives to crime, malice, brutality, self-indulgence, the last is the

more pardonable, and involves the least sinfulness.[1] And so long as law was considered to represent a vengeful Deity, and to punish in proportion to the moral enormity of the sinner, so long was drunkenness rightly pleaded in extenuation of offences. Even now in Italy it legally mitigates punishment. But I believe I am correct in saying that a higher political education has in our age changed this view, and the province of law is daily more and more considered to be confined to the protection of society, not of God—'*Deorum offensa Diis cura*' is said not in scorn, but in reverent humility. Now society, without a doubt, runs greater risk of damage by violence at the instigation of drunkenness than at the instigation of all other incentives whatever; and therefore justice has advanced so far as in theory to hold it an aggravation of an offence. She feels that she ought to be most a terror to those from whom she is in greatest danger. In theory, yes—but she has not reduced her theory to written rules; and in practice we daily read instances of the mediæval prejudice prevailing, and of criminals lightly treated because they are drunk. I should like to see this barbarous squeamishness pass away, and to see society protected by adding some deterrent degradation to crime committed during intoxication. I should like, for instance, to see the brute who kicks his wife and children when in liquor, well flogged, in addition to the penalty for assault. And drunken exposure of the person, and insults to young

[1] Dante's angelic guide is described as quoting Aristotle with approval:—

> Non ti rimembra di quelle parole,
> Con le quai la tua Etica pertratta
> Le tre disposizion, che'l Ciel non vuole;
> Incontinenza, malizia e la matta
> Bestialitade? e come incontinenza
> Men Dio offende, e men biasimo accatta?
>
> *Inferno*, xi. 79.

Reference is intended to the seventh book of the *Nicomachean Ethics*. 'Incontinenza' is a translation of ἀκρασία, and does not mean 'incontinence' or 'intemperance' in their modern narrowed senses, but includes all varieties of the recklessness of unclean living.

girls, might fairly be treated with the same indignity. The less innate turpitude there is in a criminal, the more possible it is to deter and reform him. Severity is worth practising when there is a chance of its being successful; just as when a patient has a good constitution, a vigorous treatment of accidental ailments is to be commended.

To sum up the influence of alcohol upon a healthy man, it would seem to be as follows :—

(1.) When taken in moderate quantities, and with meals, it often somewhat increases the appetite and the digestive powers. And the *modus operandi* by which it effects this object, is by curbing the deleterious consequence of excessive energy of the nervous system.

(2.) When taken in excess its first noxious influence is on the nervous system, and hence we find in predisposed women 'hysteria,' and in men 'alcoholism' or 'chronic delirium tremens.'

(3.) When taken in excess, it so far impedes the renewal of the nerve tissue, that the vital activity of the blood-vessels is diminished over-much and over-long.

(4.) Of this diminution of the circulation, one result is local congestion of various parts, temporary at first and quite capable of relief, but by long continuance tending to produce permanent lesions.

(5.) If too long deprived of the nervous energy which presides over interstitial growth, the parts fall into atrophic degeneration; and instead of elastic, fibrous, areolar, muscular tissue, and whatever else of subtle structure may be needful to animal life, there is deposited only a mass of friable, lifeless substances, midway in chemical composition between albumen and fat.

(6.) It is probable that these noxious influences are continued so long as the alcohol is retained in the blood.

(7.) The principal lesions induced by steady regular excess of alcohol are cirrhosis of the liver, Bright's disease, condensation of the lungs, thickening of the larynx and bronchi

ossification and thickening of the arteries. And it is difficult to say what secondary lesions may not follow upon these.

(8.) The increased risk to life from injury or acute disease, incurred by the intemperate, may be accounted for, by some amount of the afore-mentioned atrophy having already taken place in their bodies, and so diminishing their force of recovery.

(9.) For there appears to be a likelihood that the immediate anæsthetic power of alcohol will tend to spare the nerves the shock of the external causes of disease, and so render it less injurious to a previously sound man.

(10.) Alcohol cannot be trusted to prevent tuberculosis, though it retards its progress.

(11.) Taken in still greater excess at once, in fact so as to produce drunkenness, it is probably not nearly so fatal in its consequences. The poisonous drugging of the nervous system is followed by an attack of indigestion and general pain, during which the blood purges itself of the alcohol.

(12.) Even should the blows to the nerves inflicted by drunken bouts be continually repeated, the consequences follow in crises, and may be recovered from, which cannot be said of atrophic lesions. These crises usually consist of the well-known phenomena of *delirium tremens*, which often so alarm the patient as to lead to a reform.

(13.) Some forms of alcoholic drinks are much more deleterious than others, especially those which contain a large proportion of fusel oil.

Hence we may deduce these rules for the use of alcohol by healthy persons.

(A.) Let it be taken never as a stimulant or preparative for work, but as a defence against the injury done by work, whether of mind or body. For example it is best taken with the evening meal, or after toil.

(B.) Let the increase in the desire for and power of digesting food be the guide and limit to the consumption of all alcoholic liquids.

(C.) Let the forms be such as contain the least proportion of fusel oil.

(D.) Let all with an hereditary tendency to hysteria or other functional disease of the nervous system, refrain from its use altogether, even though as yet they are in good health. Among the hereditary tendencies must be classed a proclivity to delight in drunkenness, which remarkably runs in families. Children with such an heirloom had best be kept as late as possible without tasting strong drink.

The legislative authorities have the opportunity of materially advancing the good of their country :—

(*a.*) By cheapening through fiscal regulations all wholesome fermented drinks, such as good beer and wine, and by laying the burden of taxation on the retail trade in spirits.[1]

(*b.*) By declaring fusel oil to be a poisonous adulteration of alcoholic beverages, so that the mother of invention may teach distillers to eradicate it.

(*c.*) By severely punishing intoxication.

(*d.*) Habitual intoxication might justly be made a ground for the dissolution of marriage, in that a wrong is done to the nation, as well as to the innocent partner, when it is burdened with members incapable of contributing to the common weal,

[1] Encouragement may be taken from what has happened in California. Mr. James Morrison writes:—

'Before the introduction of native wines, when the stronger alcoholic stimulants were used, drunkenness was very common in California. The native wines are now found in nearly every household; they have supplanted to a great extent the use of the stronger alcoholic drinks. It is a fact, which no one familiar with California for the last twenty years will deny, that drunkenness is much less common now than formerly. This change is undoubtedly due to the substitution of the wine of the country for the stronger alcoholic stimulants.' The very decided effect which financial legislation can have upon the comparative consumption of different sorts of liquors is shown by the effect of the budget of April 6, 1872, which laid a heavy tax upon absinthe in France. Within a year from that date M. Bergeron was able to report to the temperance society that the consumption of the said liqueur had diminished by nearly one half. See *Revue des Deux Mondes*, March 15, 1874, p. 476.

which is so likely to be the case with the progeny of drunkards. When the wrong is involuntary, we pardon it; but alcoholism cannot plead that excuse, unless it take its stand on the ground of insanity, which removes the question into another category altogether. Those who claim the rights of free agents must answer for all the consequences of their acts.

Were the law to express such a marked disapproval of drunken husbands and wives, the benefit would extend much wider than the few whom it might free from the chain of matrimony: for it would teach men and women what a grave offence is committed by risking the parentage of an idiot, and lead them to take means to avoid it.

Nevertheless the most powerful engine for securing to mankind the beneficial influences of alcohol without its attendant dangers, is to be sought in the habits and silent pressure of social life. As our race becomes more humanised by training and experience, it is more to be trusted to make use of Heaven's gifts without abusing them; and the degradation of mind and body which alcohol is capable of entailing will become hateful at the same pace as its true value becomes understood. Such a progress is worth a hundredfold all possible legislation. The man who prefers law to custom announces a principle which would set the means above the end, would stereotype imperfect efforts, and substitute cork jackets for the power of swimming. Towards the progress of temperate habits every man can contribute—and who more powerfully than the medical man?—by the example of the moderate use of fermented beverages of the right sort at proper times, and by the discouragement of indulgence and excess. There is a difficulty in sending a drunkard to an asylum, but he is easily sent 'to Coventry' and made to feel that he is a degraded animal. There may possibly be some rare cases to be found of true 'dipsomania;' where, without any other mental disease, the patients are carried off by an uncontrollable impulse to drink; but they certainly are very

rare indeed, and every alleged instance that I have investigated has always exhibited also some other form of insanity, sufficient to justify the imposition of restraint, or else proved to be using the cant of the day as an excuse for self-indulgence. The exceptional cases may be separately dealt with, when they occur; but as a rule I think it is better to give men the education of being their own gaolers than to let them lean on the weak crutch of State inebriate asylums.

Voluntary association for the purpose of mutual encouragement in temperance, for the discouragement of drunkenness and of the use of ardent spirits, or for the prosecution of the sellers of adulterated beverages, stands on a different footing from legislative control. It is a step in self-education. But unhappily it has been stopped from useful employment by the fatal snare of exaggeration. The denouncement of alcohol as always a poison, and its use for good fellowship as a sin, is now inseparably united in our minds with societies for the promotion of true temperance; and thus the latter virtue has been retarded by the fatal prejudice of being tied up in the same bundle with a fallacy. The society formed in France about two years ago, under the title '*L'Association française contre l'abus des boissons alcooliques*,' though it may not make such a noise as our teetotalism, has a better basis of action. The proposed object is to encourage the substitution of inoffensive and salutary drinks for spirits. It accepts and recommends the use of beer, of natural wine, as well as of tea and coffee at meals, after the day's work is done, but sets its face sturdily against distilled liquors, facilities for liquoring between meals, and all excess. For my part I have faith in the continuous improvement in the human race; and I think I can see, not so very far ahead in the future, the influence of alcohol upon health perfected in its good, and deprived of its evil, without the dubious aid of any prohibitive legislation.

Some well-meaning persons think to discourage intemperance in drink by affecting a cynical carelessness as to the quality of that which is consumed. They allow their guests

'a little wine for their stomachs' sake,' but serve it out as like a drug as possible.

It is nothing to them if it be adulterated or not—'wipe away all poetry, all refinement from the cup,' say they, 'and it will cease to tempt.' This reasoning is utterly false. As long as a sensual pleasure is coarse and rude, it can be attractive only by its quantity, and all indulgence can be only excess. But let it dress itself in the charms of a higher æstheticism, let the enjoyment of it be shared with others, and be associated with noble and beautiful memories, and moderation becomes a law of its existence. The sensuality of the savage is selfish, shameless, and unbridled. With the advance of manners it first parts with its selfishness, then it acknowledges the evils of excess, and then curbs itself more and more till it ceases to be intemperance at all. True of other gratifications of instinctive desire, this is especially true of drinking. The better the wine is, and the more attractive its aspect, the less likely are people to take too much of it. When Anacreon and Horace, Phidias and Cellini, Etruscan potters and Venetian glass-blowers, conspired to wreath the goblet with a halo of romance, they substituted an elegant appreciation for a degrading animalism, and led society a step onwards in morality. And it may be noticed that our Divine Exemplar first manifested forth his glory by giving to his village neighbours not only wine, but a pleasanter wine than they were accustomed to. I, therefore, hold it to be a duty of every one to see that whatever sort of beverage is provided for his household should be the best of its sort, the most agreeable to the educated palate, and adorned with the most refined surroundings that circumstances allow. However little a man's purse allows him to drink, let it be good.

PART III.

DIETETICS IN SICKNESS.

CHAPTER I.

THE DIET AND REGIMEN OF ACUTE FEVERS.

THE principal acute fevers enumerated in the Nomenclature are small-pox, chicken-pox, measles, scarlatina, typhus, enteric (or gastric), relapsing, yellow, remittent, cholera, mumps, influenza, weed. Some varieties of these, characterised, some by more severe, and some by milder phenomena than ordinary, receive special names which would needlessly lengthen a list cited simply for the purpose of explanation.

One of the most natural and practical divisions of diseases is into *acute* and *chronic*. We are not always quite sure in which class to place the special morbid process we happen to be considering; but in an overwhelming majority of instances there is no doubt at all; and when we have decided, the light thrown on the path to judicious treatment is clear and bright. By '*acute*' disease is meant such as has a tendency to progress in a circle towards the recovery of health: each process, however dangerous and abnormal it may be, being a step towards the final arrival at that result, if only the sick man's strength hold out. While of '*chronic*' the natural road is straight on from bad to worse, unless from the interposition of some extraneous agency of accidental or designed origin foreign to the process of the disease itself. Dr. Pierre Petit, in the preface to his 'Commentary on Aretæus,' compares the former to race-horses, which run round to the goal, unless they founder on the way: one might in the same strain liken the path of the latter to that fatal descent which leads to Avernus. This division of maladies is of the most essential

importance when we undertake to estimate the value of remedial measures. Nearly all the fallacies which have overladen our druggists' shops, not to speak of a variety of theories ending in 'pathy,' which crop up from time to time, flow from watching the acute phenomena in disease, as an index of the effect of a medicine. A very moderate spice of medical logic will suffice to show that it is only from the numerical comparison of many public institutions for many years that an opinion can be formed in acute disease concerning that effect. Whereas by observing its action in chronic disease, one cautious man may, from a very small number of well-considered cases, come to a reasonable conclusion as to the value of any really active medication. I am used, therefore, in instructing pupils, to insist very much on the differences between acuteness and chronicity: I believe the idea to be of great importance in the formation of the medical mind. And in the limited department of therapeutics treated of in this volume it must not be passed over, for in the most chronic cases there are acute phenomena, and in acute cases there are sometimes elements of chronicity which require a just estimate to be formed of them, when we come to test the efficacy of our efforts at relief.

In acute fevers, it is evident that it is not our business to try and arrest the symptoms, any more than it is our business to arrest the rising tides. We must only take care that they do not swamp our boat, and the safest way to do that is to keep the vessel as sound as possible and as capable of resisting external agencies as we can make it. The value of nutrition in fevers has been observed from the earliest times: Hippocrates thought so much of it that the point of his treatise 'On the management of acute diseases' lies in his recommendation of the use of wine, and of a ptisan of barley which we now call 'gruel.' The proper preparation of the latter he considers so important, that he condescends to tell us how to make it, so that it may be 'thin, but not too thin; thick, but not too thick,' as Miss Austen describes the perfection of this

dietetic article. But during the dark ages of medical science a bugbear called Inflammation was set up, and acute disease grew to be considered a devouring flame, which must be starved out by removing fuel. This scare culminated in the French physicians of the last generation, who actually *deprived the sick of all food whatsoever*, as a mode of treatment, and called it *diète*. That was going too far, and the results terrified the neighbouring islanders, who in the person of Dr. Graves found a voice, and maintained, not only in deeds but in words, that the 'feeding of fevers' was the most essential feature in their cure. In following his master, Dr. Graves goes a step beyond the cautious Hippocrates; for though he sticks to gruel, barley water, and whey the first three or four days, he quickly after that proceeds to chicken broth, meat jelly, and strong soup. It would be a platitude to point out the difference in the mortality since this change of practice. Everybody acknowledges its wisdom, except a very few eccentrics.

The great art of duly nourishing fever patients consists in giving a frequent, almost continuous, supply of liquid nutriment containing very soluble aliments in a dilute form. Perhaps I may be allowed to quote myself on this subject, and reproduce a clinical lecture I delivered at St. Mary's Hospital thirteen years ago.

'The physician sees that a large supply of nitrogenous material must be wanting. The nitrogenous tissues are devitalised, are drained away in a disproportionate excretion of urea and other organic compounds, and nothing is taking their place. Shall he act antagonistically, and try to stop the passage of urea by the kidneys? I do not know exactly how he would set about it; but I do know that if he succeeded, he would do positive harm; for the very worst cases of fever are those in which metamorphosis is active (as shown by the heat), while the excretion of urea is arrested (as shown by the lightness of the urine); they resemble cases of uræmic poisoning from diseased kidneys. The other principles of treatment

which I noticed in my introductory lecture would not, perhaps, be so directly injurious, but common sense would still allot the palm to restoration here. Let it be your chief aim to supply that which you clearly see is passing away—nitrogenous tissue.

'But how will you supply it? Solid food would in all probability be vomited, from the unbearable loathing it excites. If not vomited, it would lie for some time a mere foreign body outside the mucous membrane of the digestive canal, and then pass away by diarrhœa, with much flatus and fetor, and much disengagement of gas during putrefaction. Your beefsteak might as well have been at once thrown down its final destination, the water-closet, to which it passes putrid, though undigested. Neither is it wise to fill the stomach with large quantities of victuals, for the same result follows. No 'meals,' therefore, must be allowed; and prudence suggests the giving in their place very small doses of nitrogenous aliment very frequently. These pass over the irritated stomach unconsciously, and are taken up gradually by the intestines, requiring but very little to make them fit for absorption. The suitablest food is that which is naturally supplied to the weakest stomach. The feeble digestive organs of babies can assimilate milk, and milk forms the most appropriate nourishment for the debilitated viscera of the fever patient. By giving two or three ounces every hour, you may get down a quart and a half *per diem*. But under ordinary circumstances every two hours is often enough. If there is sufficient acid left in the stomach to coagulate the casein into clots, and cheesy lumps are rejected by vomiting, as happens sometimes in milder cases, you may guard against this by adding liquor calcis or soda-water to the milk, or you may supply its place by beef-tea. But it is the lumping of the cheese into solid masses that it is desirable to avoid, not the acidification, which is beneficial. If the patient takes thus a good supply of milk and beef-tea, not only is the imminent danger of death by starvation avoided, but the emaciation

which follows during convalescence is much less extreme, and the dangers in its wake less formidable.

'Eggs are a highly nutritious food; if taken raw, and diluted with milk or water, they are quickly absorbed. But should they be delayed and putrefy, the products of their decomposition are peculiarly injurious: the sulphuretted hydrogen and ammonia evolved are poisons to the intestines. I should recommend you to avoid eggs till convalescence has restored the gastric powers. The same objection does not lie against milk, the lactic acid arising from whose decomposition assists in the solution of the casein. Sour buttermilk is by no means to be despised as a food.' [1]

When a patient cannot be raised in bed without risk of exhaustion, a crockery or glass feeder is a convenience, but the same vessel, or even one of the same appearance, should not be used for food and for medicine.

If the patient's mouth be foul, as in small-pox or putrid fever, it should be cleansed when he is fed. The administration of nutriment should then be so frequent that it is not allowed to become again foul. In fact the cleaner it is kept in the intervals, the better.

Food taken by the mouth should, as a rule, be as near the natural temperature of the body as possible. But when the febrile heat is very high, or there is much nausea, some of it may be iced with advantage.

When the stomach is inflamed, as we are taught by morbid anatomy to know it is in severe scarlatina, or when there is vomiting, only a few teaspoonfuls should be drunk at once, and everything cold and dilute. The admixture of pepsine, in quantity not exceeding 20 grains a day, is also beneficial to these patients. If it purges, it may be guarded with a few drops of laudanum.

In obstinate vomiting and other instances where the ordinary paths of absorption refuse to fulfil their functions, it is necessary to get nutriment taken in by unusual routes.

[1] *Lectures Chiefly Clinical*, London, 1864, lect. vi. of 4th ed.

This is often the case at the height or later end of acute fevers, and then life may be sustained a long time by nutritive injections into the lower end of the bowel. Physiological experiments undertaken with the view of testing the power of absorption in these parts have demonstrated that many soluble drugs may be introduced into the blood through their mucous membranes. Opium, for instance, acts quickly when so given. And if drugs, why not aliment? Food thus administered in enema must be dilute, and it must be warm, and then very likely the still secreted intestinal juices which descend from above may dissolve a considerable amount of its starch and animal fibre. Yet a surer way of securing the solution is to add a small quantity of pepsine to take the place of gastric juice, and also of diastase (in the shape of malt) to supply the deficiency of saliva.

When life seems passing away under their eyes, the friends will often shrink from tormenting (as it seems to them) the sick man with food. Let them not despair: many a one has recovered after the doctor has taken his leave with a sad shake of the head, and without making a fresh appointment. And let them also be stimulated by this fact—namely, that the pains of death are aggravated, if not mainly caused, by the failure of nutrition. Even when apparently insensible, the dying suffer much increased distress from want of food, though they cannot express their sufferings.

The use of alcohol in fevers is regulated by the condition of the nervous system. If there is great prostration of strength, or tremulousness of the hands, or quivering in the voice and respiration, if there is delirium of a low muttering character when the patient is left quiet, then it is required. Or if the patient is habituated to a full allowance, it is well to continue to give a little. A sharp, weak, unequal beat of the heart is a warning that some of these symptoms are likely soon to come on. All these indicate that the nervous system is feeling very sensitively the destructive metamorphosis going on, and has its power lowered by its sensitiveness. Then is

the opportunity for the strong anæsthetic we are speaking of, which I order without scruple, though I do not view it, like food, as part of the necessary cure of fever. Above all, the friends must be warned not to employ it as a substitute for food: it may be useful as an adjunct, but can never take the place of true restoratives.

The form of alcoholic liquors must depend a good deal upon the purses of those who pay for it. Sound port, burgundy, and champagne, are the best, but I do not despise cheap gin if I can get nothing else.

It contributes greatly to the appetite of a sick person if the nurse is of fresh, clean, and cheerful aspect. Her dress should be of some washing material which does not rustle, of a soft warm colour, and not stuck out with crinoline or any other sort of 'dress improver.' Black is always nasty to the sensitive olfactory nerves of an invalid. Above all, she must have a quiet decided manner, and never fidget.

Cookery for Fever Patients.

White Wine Whey.

(All Wheys are Sudorific and Nutritive.)

Put two pints of new milk in a saucepan and stir it over a clear fire till it is nearly boiling; then add a gill of sherry, and simmer for a quarter of an hour, skimming off the curd as it rises. Then add a tablespoonful more sherry and skim again for a few minutes.

Rennet Whey.

To a quart of new milk, either warm from the cow, or heated up to the same temperature, add a large tablespoonful of rennet.[1] Keep up the heat a little higher till the curd separates, and take it off with a spoon.

[1] See end of chap. ii. sec. 7, in first part, p. 61.

Lemonade.

Pare a lemon very thin and put the paring in a jug with an ounce of sugar candy. Squeeze the lemon into it, and pour on a pint of boiling water. Orange or pineapple may be used instead of lemon as a variety.

(Other aqueous drinks, good in both health and sickness, have been already mentioned at the end of Chapter II. § 10 in the First Part, p. 81.)

Linseed Tea (Demulcent and Diuretic).

Whole linseed, one ounce;
White sugar, one ounce;
Liquorice root, half an ounce;
Lemon juice, four tablespoonfuls.

Pour on the materials two pints of boiling water, let them stand in a hot place four hours, and then strain off the liquor.

Do not give this to patients taking lead, iron, or copper.

Barley Water.

Wash two ounces of pearl barley with cold water. Then boil it for five minutes in some fresh water, and throw both waters away. Then pour on two quarts of boiling water, and boil it down to a quart. Flavour with thinly cut lemon rind and sugar to taste, but do not strain unless at the patient's special request.

Water Gruel.

Mix one large tablespoonful of oatmeal into a smooth paste with a little cold water. Pour in, mixing all the time, a pint of boiling water. Boil for ten minutes, stirring as before, and strain. It may be eaten with salt or sugar, according to taste.

Another Gruel.

Grits $\frac{1}{2}$ oz.; Water $\frac{2}{3}$ pint; Milk $\frac{1}{3}$ pint; Sugar $\frac{1}{2}$ oz. (*Children's Hospital*).

Arrowroot.

Mix one large tablespoonful of arrowroot into a smooth thin paste with a little cold water. Pour in a pint of boiling water, and flavour as required.

For 'milk gruel' and 'milk arrowroot' milk is substituted for water.

Rice Gruel (*somewhat astringent, in cases of diarrhœa*).

Take of

Ground rice, two ounces;
Cinnamon, a quarter of an ounce;
Water, four pints.

Boil for forty minutes; then add a tablespoonful of orange marmalade.

Bael Drink (*in dysentery and diarrhœa*).

The liquid extract of unripe Bael fruit (*Liquor Belæ*), one or two tablespoonfuls to a pint of water.

Alum Whey (*in diarrhœa*).

Use alum in place of rennet to curdle the milk, in the proportion of about a quarter of an ounce to the first. Otherwise make it as rennet whey.

Almond Drink (*softening and nutritive in chest cases*).

A useful and pleasant drink may be quickly prepared by rubbing up two ounces of the 'compound powder of almonds' (to be got at any chemist's) with a pint of water.

Claret Cup for Invalids.

Half a bottle of claret to a bottle of soda-water. Half a dozen drops of sweet spirits of nitre (*spiritus ætheris nitrosi*) put into the jug first gives a fruity flavour.

Egg Nogg of the British Pharmacopœia.

Best French brandy, four ounces;
Cinnamon water, four ounces;
Yolks of two eggs;
Sugar, half an ounce.

Rub the sugar and egg yolk together, then add the rest.

Cleansing Wash for the Mouth before Food.

A tablespoonful of Condy's solution[1] in a pint of tepid water.

Egg Soup.

Water, one pint;
The yolks of two eggs;
Butter, a lump as large as a big walnut;
Sugar, according to taste.

Beat them up together over a slow fire, gradually adding the water. When it begins to boil, pour it backwards and forwards between the saucepan and jug till quite smooth and frothy.

Panado.

Bread crumb, one ounce;
Mace, one blade;
Water, one pint.

Boil, without stirring, till they mix and turn smooth, then add a grate of nutmeg, a small piece of butter, a tablespoonful of sherry, and sugar, according to taste.

Whole Beef-tea.

Make the cook understand that the virtue of beef-tea is to contain all the contents and flavours of lean beef in a liquid

[1] Or two tablespoonfuls of the 'liquor of permanganate of potash' of the *British Pharmacopœia*.

form; and that its vices are to be sticky and strong, and to set in a hard jelly when cold.

When she understands this, let her take half a pound of fresh-killed beef for every pint of beef-tea required, and remove all fat, sinew, veins, and bone. Let it be cut up into pieces under half an inch square, and soak for twelve hours in one-third of the water. Let it then be taken out and simmered for two hours in the remaining two-thirds of the water, the quantity lost by evaporation being replaced from time to time. The boiling liquor is then to be poured on the cold liquor in which the meat was soaked. The solid meat is to be dried, pounded in a mortar, freed from all stringy parts, and mixed with the rest.

When the beef-tea is made daily, it is convenient to use one day's boiled meat for the next day's tea, as thus it has time to dry and is easier pounded.

A wholesome flavouring for beef-tea is fresh tomato, now so commonly grown on a south wall in gardens. A piece of green celery stalk, or a small onion, and a few cloves, may also be boiled in it. Leeks give it a fusty flavour, and mushroom ketchup, which some cooks introduce, is of doubtful composition.

While this is a-cooking, some more hastily prepared in the usual way may be used, or even Liebig's Extract, provided care be taken that the latter is sufficiently diluted, so as not to turn the stomach.

Quicker but less economical beef-tea.

One pound of raw beef, minced, for each pint of water. Stir up cold and let it stand one hour. Then place the vessel in which they are mixed in a pan of water and heat them up to about 180° Fahr. for another hour over a slow fire. If boiled up to 212° it becomes gluey, and is not equally nutritious or digestible. Run the tea through a coarse strainer, and flavour at discretion.

Beef and Hen Broth. (Gouffé).

Still quicker and still less economical is the following :—

Take 1 lb. of lean beef ;
½ a hen, boned ;

Pound together in a mortar; add ¼ oz. of salt; put in a stewpan with 2½ pints of water ; and stir over the fire till boiling ; then add carrots, onions, leeks, and celery, cut fine ; boil for half an hour ; strain, and serve.

Beef-tea and broth should not be kept hot, but heated up as required. It may be warmed, but never prepared in the sick room, for nothing sets an invalid against food so much as cooking. If a nurse can rig up a fire or a gas stove for her own use in an adjoining room, well and good ; but if not, she had better descend to the kitchen. In summer, when a fire is undesirable, she may employ Silver's patent Norwegian cooking box, in which cooking is done by hot water. But it is rather an expensive mode of attaining a simple object, unless the nurse were to keep one as part of her stock in trade.

Chicken Broth.

Skin, and chop up small, a small chicken, or half a large fowl, and boil it, bones and all,[1] with a blade of mace, a sprig of parsley, and a crust of bread, in a quart of water for an hour, skimming it from time to time. Strain through a coarse cullender.

Chicken broth poured on sippets laid on the bottom of the dish, makes a good sauce for boiled chicken or partridge, when the invalid is well enough to be allowed solid food.

Mutton Broth.

Lean loin of mutton, one pound, exclusive of bone ;
Water, three pints.

[1] Some people add the feet, which contribute a peculiar, and not always acceptable, flavour.

Boil gently till very tender, throwing in a little salt and onion, according to taste. Pour out the broth into a basin, and when it is cold, skim off all the fat. It can be warmed up as wanted.

If barley or rice is added, as is desirable during convalescence, it must be boiled first separately, till quite soft, and added when the broth is heated for use.

Eel Broth.

Skin, clean, and chop up into pieces an inch long, half-a-dozen small eels. Boil them in a pint and a half of water, skim, and then cover over and stew for forty minutes. This makes a capital stock for a *souchée* of flounders, sole, or perch, and a very good change for convalescents from fevers. The object is to avoid giving butter sauce, which is apt to turn rancid.

Boiled Pigeon or Partridge.

Clean and season the bird, enclose it in a puff paste, and boil. Serve in its own gravy, supplemented by the liver rubbed up with some stock, and do not forget the bread sauce.

Bread Sauce.

The crumb of a French roll;
Water, half a pint;
Black pepper, six to eight corns;
A small piece of onion and salt to taste.

Boil till smooth; then add a piece of butter about as big as a walnut, and mix for use. It is good hot with hot birds, cold with cold birds, and is an excellent food for the sick.

Nutrient Enema.

(*In cases where the stomach rejects food.*)

Take of beef-tea half a pint, and thicken it with a teaspoonful of tapioca. Reduce $1\frac{3}{4}$ oz. of raw beef to a fine

pulp, pass it through a fine cullender, and mix the whole up with 20 grains of acid pepsine (Boudault's *poudre digestive*) and 4 grains of diastase (or a dessert-spoonful of malt flour)[1] (Fonssagrives).[2]

It should have a bright rose tint, and exhale a rich meaty odour. Not more than a quarter of a pint at once should be used, and that slowly. Thus, frequent repetition is facilitated.

Pending the arrival of the pepsine and malt, the other portion of the liquid may be administered alone.

Malt Tea.

(*Nutrient in cases where the mouth is very dry.*)

Boil three ounces of malt in a quart of water.

Biscuit and Milk.

Soak for about eight hours, till it is quite pultaceous, a hard captain's biscuit in milk or in water. Pour off what it has not absorbed, and mix it up in a pint of new milk.

Bread Pudding.

Pour over a French roll half a pint of boiling milk, cover it close, and let it stand till it has soaked up the milk. Tie it up lightly in a cloth, and let it boil for a quarter of an hour. Turn it out on a plate, and sprinkle a little sugar candy over it. The addition of burnt sugar or tincture of saffron will give it the established yellow colour.

Rice Pudding.

Boil two ounces of rice in a pint of milk, assiduously stirring till it thickens. Take it off and let it cool. Then mix in well two ounces of butter, a quarter of a nutmeg grated, and sugar in moderation, according to taste. Pour it into a buttered dish and bake.

[1] Where malt flour is used, the tapioca may be omitted.

[2] *Journal de Méd. et de Chir. Prat.* 1862.

Batter Pudding.

Flour, three teaspoonfuls;
Milk, one pint;
Salt, a pinch;

Of powdered ginger, nutmeg, and tincture of saffron, each a teaspoonful. Boil.

The point in the last three recipes is the avoidance of eggs, which, when baked or even when boiled so long as it is necessary to boil puddings, are quite insoluble in a weak stomach. If, however, they are dressed separately, and either kept raw or lightly heated, they may be made into a custardy sauce, which is quite digestible in small quantities. To this a little wine may be added as a flavouring.

The Invalid's Tea.

Pour into a small china or earthenware teapot a cup of quite boiling water, empty it out, and while still hot and steaming, put it in the tea. Add enough boiling water to wet it thoroughly, and set it close to the fire to steam for five or six minutes. Then pour in the quantity of boiling water required, from the kettle, and it is ready for use.

The Invalid's Mashed Potato.

Boil one pound of potatoes with their jackets on till they are tender or brittle. Peel them, and rub them through a fine sieve; when cool, add a small teacupful of fresh cream and a little salt, beating the *purée* up lightly as you go on, till it is quite smooth, and warming it up gently for use.

CHAPTER II.

DIET OF CERTAIN OTHER INFLAMMATORY STATES.

Inflammation arising from the congestion of any part of the body, whether in immediate consequence of injury, cold, heat, or other external accident, or from some previous disease or lesion, gets well soonest and safest when the blood is kept in as normal a condition as possible. The healthier and more efficient for nutrition the blood is, the more freely it circulates, the less are the throbbing, the swelling, the heat, the formation of mucus, pus, or fibrin, and the risk of ulceration or gangrene. Bruises, wounds, sores, and the necessary gaps made by the surgeon's knife, all heal the better for the blood being kept red and fluid.

Now starvation has precisely the opposite effect: it augments the proportion naturally borne by the fibrin to the red blood-globules; it makes the circulating fluid more readily coagulate, more adhesive, and consequently more prone to stick to the sides of the minute vessels through which it ought to flow, and more liable to block them up, and thus to favour their throbbing and swelling, and sometimes their rupture. Also, by letting effete material remain to form the bulk of the blood, it renders that fluid unfit to supply new tissue, and pus, mucus, &c., are supplied instead. Pus is, in fact, imperfect flesh strangled in its conception, bioplasm which has lost its plasticity.

Our object then should be to keep the blood in the highest health, by giving it all the nutriment it is capable of duly absorbing. The arguments used regarding general fevers

apply more forcibly here, in that, the whole body not being so universally smitten with disease, the stomach (as we are often told by the appetite) retains much of its assimilative power, and is more likely to make a good use of what is given it than in the former case.

When the desire for food is genuine and keen, there is no objection to the continuance of the ordinary allowance of animal and vegetable diet at the usual times. But care must be taken to notice that the appetite is real, and not a wish dependent on whim, habit, or the aim at appearing less ill than people suppose.

The above rule, however, does not apply to stimulants. Beer, wine, or spirits, if allowed at all as a food or with food, must be restricted to smaller quantities than are taken in health. The patient's nutrition goes on better without them altogether, unless the state of the nervous system, as in fevers, should require the adventitious aid. (See last chapter.)

When loss of appetite indicates that the powers of the stomach are in partial abeyance, then the nutrient administered should be liquid, easily convertible into chyle, and in frequent small doses, for the reasons before detailed.

After surgical operations, and in many other cases where there is a tendency to a copious formation of pus, health is promoted by the use of fresh green vegetables and of lemonade, and of digestible fruits, such as recently gathered grapes, currants, blackberries, barberries, or whortle-berries. Oranges and pomegranates are cooling to the mouth, and occupy agreeably many a dull minute in the eating. They are all wholesomer before food than after.

Hitherto common, or non-specific, inflammation has been spoken of. When the inflammation has a specific character, a new element is introduced into the treatment, and the general rules above alluded to do not apply.

In Acute Rheumatic Fever experience demonstrates that a nutrient analeptic diet retards recovery, and will even bring on a relapse during convalescence. It is a paiufnl

thing to restrain a patient from wholesome food when he craves for it, but in this instance it is our duty. If meat in any form, solid or liquid, be eaten, it seems to turn into lactic acid, which many think is already in excess in the rheumatic blood—at all events it adds to the quantity of organic acids in the body. The power of fully converting it into living flesh is wanting, and until this power is regained, a semi-conversion into the substance named takes place. The smell of sour milk in the skin of rheumatic fever patients is well known, and seems to support the theory alluded to. Meat augments it, and adds also to the acidity of the urine. The redder and more muscular the meat is, the more it disagrees.

Vegetable food does not turn so copiously or so quickly acid; so that water gruel of oatmeal, grits or rice, soup meagre, jellies, spiced rice, plain boiled rice, panado and other various preparations of bread, mashed potatoes, porridge, arrowroot and semolina puddings, Oswego corn, and the like, must be used to satisfy the mouths which often loudly complain of starvation. The cases which prosper are those where the appetite is keen, but has been denied any food beyond what is absolutely necessary to barely sustain life. The aqueous drinks should be alkaline.

Even when the pains are gone and nature calls for the replacement of the lost flesh, the diet which promises most readily to replace it will sometimes bring on a relapse, and you must very cautiously go back to 'ordinary diet,' else you run a risk of eventually losing time by overmuch haste.

But it cannot be said of acute rheumatism as of other cyclical fevers that the diet is the most important part of the treatment. The action of variations of temperature, especially in the direction of cold, is so extremely injurious in prolonging the disease, increasing its painfulness, and endangering life by causing pericarditis, that indubitably a more paramount value attaches to a scrupulous protection of the body against such changes. Freshness of air, so valuable in typhus and its allied states, is in this case a minor, very minor, consideration

compared with its steady warmth. You must be careful, even when making your daily stethoscopic examination, not to expose the chest to chill. A careless and dangerous doctor may always be known by his neglect of precaution in these cases. Chilling the skin of a rheumatic fever patient not only turns the rheumatic inflammation into fibrinous inflammation (as in pericarditis), but it also still further deteriorates the process of nutrition. After a chill you will see the urine become turbid from the deposit of lithates, the effete products of a deranged assimilation. Dieting the sick is useless unless appropriate means are adopted for securing the digestion of the diet. And the most essential means in rheumatic fever is attention to the temperature.[1]

In Gout, during the acute access, the same restricted diet conduces to shortening the inflammation; but it is not so imperative, and when the general health has been weakened by previous attacks it cannot often be borne. The treatment of chronic gout and the gouty diathesis requires separate consideration.

Soup Meagre.

Take of butter half a pound. Put it in a deep stew-pan, place it on a gentle fire till it melts, shake it about, and let it stand till it has done making a noise; have ready six medium-sized onions peeled and cut small, throw them in and shake them about. Take a bunch of celery, cut it in pieces about an inch long, a large handful of spinach cut small, and a little bundle of parsley chopped fine; sprinkle these into the pan, and shake them about for a quarter of an hour; then sprinkle in a little flour and stir it up. Pour into the pan two quarts of boiling water, and add a handful of dry bread-crust broken in pieces, a teaspoonful of pepper, and three blades of mace beaten fine; boil gently another half-hour. Then beat up the

[1] I have enlarged more fully on this important subject in *Lectures, Chiefly Clinical*, lectures xi., xii., and xiii., 4th ed.

yolks of two eggs with a teaspoonful of vinegar, and stir them in, and the soup is ready.

The order in which the ingredients are added is very important.

Bread Soup.

Take the crust of a stale roll, cut it in pieces, and boil it well in a pint of water with a piece of butter as big as a walnut, stirring and beating them till the bread is mixed. Season with celery and salt.

Alkaline Drink.

Cut the rind of a lemon very thin, and put it in a jug with a tablespoonful of powdered sugar-candy. Pour on it a little boiling water, and when it is dissolved, half a pint of Vichy water, and half a pint of common water.

The White Drink. (*Décoction Blanche*).

Burnt hartshorn, powdered, two ounces;
Gum arabic, an ounce and a half;
Water, three pints.

Boil down to a pint, strain, and add sugar.

Isinglass Jelly.

Boil an ounce of isinglass and a dozen cloves (if liked) in a quart of water down to a pint. Strain hot through a flannel bag on to two ounces of sugar-candy, and flavour with a little angelica root, or two or three tablespoonfuls of *Liqueur de la Grande Chartreuse*, if cloves are not relished.

Hartshorn Jelly.

Boil half a pound of hartshorn shavings (not 'raspings,' which are adulterated with bone dust) or an equal weight of ivory turnings, in three pints of water down to a pint, strain, and add three ounces of white sugar-candy, and an ounce of lemon juice. Heat again up to the boiling point. As a variety

in flavouring, white Capri, Moselle, or champagne may be used in quantity not exceeding two tablespoonfuls.

The gelatine derived from these sources claims no advantages over that obtained, as directed in cookery books, from calves' feet. But it is more soluble and digestible than if made from the ordinary 'gelatine' of the shops, which is manufactured from old bones, probably after maceration in acid. There is something gained by using for invalids dishes differing in name and substance from those usually set before the robust, as it is thus easier to secure their being made properly, and not according to the traditions of the kitchen. A cook whose 'calves' feet jelly' has been commended, will demur to receive a recipe for its ingredients from the doctor, but will allow him to be in his legitimate province when he orders hartshorn or isinglass—they are, or were lately, in the Pharmacopœia.

Bread Pudding (with egg).

Take of crumbs of bread, 2 ounces;
New milk, $\frac{1}{3}$ of a pint, boiling hot.

Pour the hot milk on the bread, and let it stand about an hour covered up: then add the yolk of an egg, well beaten; then a teaspoonful of rose or orange flower water, a little nutmeg, and half an ounce of sugar. (Instead of sugar, some prefer salt.) Beat all up together. Tie up and boil or steam or bake three-quarters of an hour.

Bread Pudding (without egg).

Pour half a pint of boiling milk over a French roll, and let it stand, covered up, till it has soaked up the milk. Tie lightly in a cloth, and boil twenty minutes.

Mutton Broth.

$\frac{3}{4}$ lb. of neck of mutton, free from fat, 1 oz. of carrots, 1 oz. of turnips, $\frac{1}{2}$ oz. of onions, $\frac{1}{2}$ oz. of barley. Boil first

the barley in ½ pint of water, for half an hour, and throw that water away; then put the boiled barley and the meat in 1½ pint of water; boil and skim for a quarter of an hour; then add the vegetables, and boil till the meat is tender. To make 1¼ pint of broth.

Rose Tea.

Take of red rose-buds (the white heels being taken off) half an ounce;
White wine vinegar, three tablespoonfuls;
White sugar-candy, one ounce.

Put them in two pints of boiling water, and let them stand near a fire for two hours, then strain.

Similar acid drinks may be made of apple jelly, guava jelly, damson cheese, or syrup of gooseberries, barberries, &c., and a variety is always agreeable.

Sage Tea.

Take of leaves of green sage, plucked from the stalks and washed clean, half an ounce;
Sugar, one ounce;
Outer rind of lemon peel, finely pared from the white, quarter of an ounce.

Put them in two pints of boiling water, let them stand near the fire half an hour, then strain.

When the sage is dried, it must be used in rather less quantity than above mentioned.

In the same manner teas may be made of rosemary, balm, southern-wood, &c., and are convenient to prevent a thirsty patient taking too much tea and coffee when not good for him. The use of acid is also avoided.

Oatmeal Tea.

Take of oatmeal a handful;
Boiling water a gallon.

Mix in a deep vessel. Let the oatmeal subside, which it

does in half an hour, and pour off the tea. By this process hard water is made digestible.

The main difference between these recipes and those given at the close of the last chapter is, that nutrition is not made an object. When it is desired, the same means are available as have been already advised in lower fevers.

CHAPTER III.

THE DIET AND REGIMEN OF WEAK DIGESTION.

Chronic deficiency of power in the stomach, atonic dyspepsia, is evidenced by a sense of uneasy distension in the front of the waist, coming on an hour or so after food, and often lasting till it is temporarily relieved by the next meal or by sleep. There is no sharp pain on pressure—indeed, gentle rubbing seems to give relief. The sensation hardly ever amounts to pain, except in highly nervous or hysterical persons, or where a great formation of air gives rise to colicky spasms. Portions of undigested food are apt to regurgitate, and are rancid with butyric acid. This occurs at a later period after food than the more familiar 'acidity,' or sensitiveness to the normal acidity of the stomach, which is found in nervous hyperæsthetic persons.

Constipation, or what is called 'sluggish liver,' is often a symptom which attracts the notice of a patient and brings him to a physician. And most cases have been already much aggravated by the attempt to obviate the inconvenience with the aid of purgative drugs. The constipation really arises from the extension of the want of tone in the stomach to the secretions and propulsive movements of the intestines, and the habitual indulgence in opening medicine increases this. From want of tone, also, the ilia and colon dilate, and are blown up with retained air. And the dilatation causes pain, especially in the waist and under the shoulder-blades.

If regular, the evacuations are pale, scanty, and unformed. Should any excess in eating nitrogenous food be committed,

there is sometimes a temporary diarrhœa and fetor in what comes from the bowels. Sometimes the looseness is almost constant.

This condition of the digestive canal is well demonstrated by the aspect of the tongue, the lips, and the gums. They are pale, and retain the impress of anything pressed upon them, and easily bleed. So that the tongue bears marks of the teeth along its edge, and the efforts of swallowing elongate the uvula. Sometimes streaks of blood which have exuded are hawked up, and the tickling of the glottis by the lax pendent uvula causes a cough, and the patient is alarmed by the fear of pulmonary consumption.

Palpitation of the heart, and sometimes intermission of the pulse, are noticed, especially where the flatulence is great. The pulsation is rapid on excitement, but is soft and slow during repose.

The urine, as a rule, is pale and watery, with a low specific gravity, indicating thus, by the deficiency of urea, an imperfect nutrition. The phosphates are also deficient, but still form a cloud when the fluid is subjected to heat, showing its abnormal deficiency of acid. Care must be taken that these characteristics of the renal secretion do not arouse a fallacious fear of Bright's disease in the kidney.

The intellectual faculties do not appear to be impaired, but there is a heaviness and disinclination for exertion which induces the patient to say they are, as an excuse for his sluggishness. If sleep be indulged in during the day, it is unrefreshing, and often leaves headache and weariness behind it.

In the case of atonic dyspepsia, I have departed from the general plan of this little volume in giving details of the symptoms of the disease, because these symptoms have each a decided bearing on the dietetic treatment. The first-named group of sensations appear to depend on the quantity which is taken at once, and are much less perceived when small and frequent meals are made the rule. These moderate meals during the day should be reinforced by a light supper on going

to bed. And the period of waiting before breakfast may be made less exhausting by a cup of milk with a teaspoonful of rum in it.

Fluids should be drunk in moderation, and never at the commencement of the meal. For over-dilution weakens the gastric juice, which is scanty at first; but when it is poured out more copiously, fluids assist the onward motion of the chyme through the pylorus, and obviate that delay which gives rise to the feeling of uneasiness.

The nature of the food is of less importance than its quantity; but still it has an influence. Rich, greasy sauces are especially to be avoided; for, meeting in the stomach with the acidifying remnants of the former meal, they rapidly undergo the butyric fermentation and turn rancid. No acid is so disagreeable to the stomach and œsophagus as the butyric; and therefore, when this forms, relief is often experienced on stopping that form of fermentation by another acid. A few drops of diluted phosphoric or muriatic acid, a teaspoonful of lemon juice, or even a piece of sour apple, or a little Chili vinegar, often palliate the distress. But the wisest course is to avoid the cause.

The bill of fare should be varied from day to day, but as simple as possible at each meal. Considerable comfort is often gained by dividing the animal from the vegetable food, taking one at one meal and the other at another. Vegetable food is much less likely to cause flatulence if taken alone.

Vegetables should not be omitted from the dietary, or the future health will suffer. But such should be selected as cause least inconvenience, and the mode of dressing them adjusted and experimented upon till the patient finds how much and how many suit his peculiarities. Spinach can almost always be borne either chopped up, or served as cabbage, or in soup. And so generally can tomatoes, squashes, vegetable marrows, Elector's caps, salsify, scorzonera, beet-root, and French beans. Peas must be very young and soft. Potatoes must be old, and cooked according to the recipe in

the last chapter but one. Of cauliflower only the friable white flower is fit for eating.

Raw fruit should never be eaten at the end of a meal. But roast apples, if taken with a little cream and hardly any sugar, are digestible enough. Between meals or as a separate meal, a bunch of grapes, a few strawberries, currants, or raspberries with a crust of bread, aid rather than impede digestion.

All bread should be stale or toasted. The best is that which is closest grained and most friable. If the teeth are sufficiently sound, crust is preferable to crumb. Biscuits should be made with water, and not sweet. Of other farinaceous food it may be remarked that almost all depends on the cooking. Pastry, from its mechanical texture, is very slow of solution, and should be cut out of the bill of fare altogether; but the same flour made into bread pudding can generally be tolerated without inconvenience. Semolina, tapioca, and arrowroot are a safe variety.

Cheese after dinner always disagrees. But it is nutritious, and is often missed much by the patient. If so, let him try it toasted as a separate meal. It should be quite new, cut into thin slices buttered and basted while toasting with a little cream. Let it be brought up on a hot-water plate, and not allowed to become hard and tough.

Meat should be eaten twice a day. It ought not to be cooked a second time. A table of precedence in comparative digestibility is given in a former part of this volume,[1] which, as far as the butcher's meat and game are concerned, is applicable to the selection of food in atonic dyspepsia. If anyone can extend his acquaintance as far as 'roast beef,' he may consider that he is not an atonic dyspeptic.

The wholesomest fish for weak digestions are boiled flounders, whiting, haddock, sole, plaice, brill, perch, among which a free choice may be made. Cod must be taken with more caution. It, however, bears cooking by dry heat better

[1] Page 114.

than the aforenamed, and if well done in cutlets suits delicate stomachs often better than the others. Rich and oily-fleshed fishes, such as eels, herrings, pilchards, sprats, salmon, mullet, and those of very firm texture, such as turbot, tunny, pike, had best not be attempted by invalids at all. The condiment should be a squeeze of lemon or Duke of York's pepper sauce.

It must be observed that so powerful is the influence of the mind over the body that nothing is more common than for persons to exhibit wonderful idiosyncrasies respecting their capability of digesting peculiar articles of food. Those who have a strong will seem able by perseverance to use themselves to assimilate almost anything assimilable. The gratification of desire puts the nervous system into a state most favourable to the secretion of gastric juice, and the thwarting of a prejudice, however whimsical, upsets temper and stomach at the same time.

Some dyspeptics get into a bad habit of erasing from their future bill of fare everything that has once seemed to be followed by inconvenience. The result is an unwholesome monotony of wrongly-selected victuals, and a despairing resignation to a needless abstinence. Let them on the other hand take the more hopeful course of *adding* to their dietary everything that they have once found to agree, and they will have a choice nearly as extensive as their robust brethren could wish. If one cook cannot make a coveted article digestible, let them try another.

Sugar at the latter end of meals certainly generates an excess of organic acids, and is to be avoided. But yet, in moderation, it promotes (as observed by Blondlot) the flow of gastric juice; so that the custom adopted by Oriental nations[1] of taking a few bonbons and sweeties is in accordance with reason, and might prudently be experimented on in this country. An excellent dietetic fillip to the appetite is a couple of pepsine lozenges, or the same quantity made into pills with sugar.

[1] See Rawlinson's notes to *Herodotus*, b. i.

Fermented liquors in atonic dyspepsia are apt to cause a congestive flushing of the brain, face, and neck, and a throbbing of the arteries. This may be viewed as an external evidence of what is going on unfelt in the abdomen. If these symptoms are prominent, a state of things is indicated not at all favourable to digestion, and we may be sure that alcoholic stimulants, *in the quantity taken*, are injurious. But that does not prove that in less quantity, or more dilute, they may not be beneficial. There is a quantity, capable of being arrived at in each separate case by experiment, *par la voie d'exclusion*, which just succeeds in stimulating the appetite without flushing the face. Very small, indeed, that quantity is sometimes; yet it is an actual measurable quantity, not 'infinitesimal.' It has a genuine physiological effect, to be accounted for by its observed action on the nervous system, and missed when it is not taken. I have known, for instance, the small sip of wine drunk at the Sacrament of the Lord's Supper to make a decided difference for good in the digestion of an immediately following meal.

If a patient has the common sense to regulate himself according to the forementioned guide, there is not much need for interfering with the nature of the vintage he patronises. Port, Burgundy, and dry sherry agree if limited to tablespoonfuls. But if he persists in neglecting the warning, then we should persuade him to take claret, hock, or Capri. Not that these are really better for him, but they are more dilute. Beer, sweet champagne, and sparkling wines in general, almost always give rise to fermentation. Some persons find it suits them not to have any alcoholic drink during the day, but to take a glass of hot whisky toddy on retiring to rest.

Tea is most refreshing to the dyspeptic if made in the Russian fashion, with a slice of lemon on which a little sugar candy has been sprinkled, instead of milk or cream. One small cup of an evening is enough, and at breakfast its place is well taken by cocoa made from the nibs.

Constipation is effectually obviated by the habitual employ-

ment of green vegetables, porridge, brown bread, charcoal, and a few other articles of diet containing a good deal of unirritative matter which yet is not dissolved by the solvents. Olive oil and mustard also assist in effecting the same object. But it is better to allow the continuance of constipation than to administer purgatives, and it is wise from the first to try and disabuse your patients of the fallacy that the bowels not open every twenty-four hours are in mischief.

Where there is a looseness, from the food passing away undigested, a few drops of laudanum at night will often give it a chance of solution by detaining it in the bowels.

'Stomach cough' and 'Stomach sore throat,' described at the beginning of the chapter, are best treated by not sitting down to breakfast without having gargled the throat with alum-water, or sprinkled the back of the fauces with dilute hydro-sulphurous acid. If the mouth is foul and the breath heavy of a morning, a cleansing with a weak wash of Condy's solution is also a good preliminary to eating.

Palpitation of the heart and of the abdominal aorta are almost always made worse by special remedies directed to them, because the thoughts are thereby induced to concentrate themselves on the suffering organs. They do not lead to any organic affection, and are useful as an index to the improvement or decline of the patient.

A low specific gravity of the urine is an indication for the use of tonic medicines. An abnormally high specific gravity shows that more vegetables should be eaten.

When the medical attendant thinks fit in a case of atonic dyspepsia to order quinine and strychnine, alone or in combination, or iodide of potassium, care should be exercised not to eat within an hour before or after, as the mixing of the drug with food in the stomach diminishes the efficiency of both. But rhubarb or aloes, in the exceptional cases where they are advisable, may be used with advantage along with the meal; while pepsine is beneficial only in that combination, and iron should be taken by itself after food. It is right, however, to

say iron rarely suits well for long together. Cod-liver oil, a good dietetic tonic in some instances of this form of disease, agrees best the last thing at night, and made up with a little soda and milk. During the day, it is apt to turn rancid, and return unpleasantly. Aromatics (such as teas or infusions of cloves, cinnamon, horse-radish, canella, and calumba), as also bitters (such as quassia, hops, and wormwood), are useful only just before meals. I have seldom found mere bitters do good.

The employment of alkaline mineral waters containing soda, especially Apollinaris and dilute Vichy water, is sometimes a great comfort. The only way in which we can explain this is that alkalies, as observed by Corvisart, by a sort of antagonism augment the secretion of gastric juice. They should be drunk, then, at the commencement of the meal, and not afterwards, when they would neutralise what is already secreted.

Mineral acids, the most digestible of which is the phosphoric, are best on a full stomach.

As respects the general regimen, it should be of a bracing character. As much time as possible should be spent in the open air, but exercise should not be carried to the point of producing over-fatigue. Riding in company, especially the company of ladies, is perfection; but bowls, archery, croquet, and lawn tennis, are not to be despised as wholesome amusements. Along with moderate exercise, sound rest, especially at night, in a quiet bed, should be secured; but coddling in hot rooms, sleeping by day, and giving way to slight feelings of discomfort, or the avoidance of society under pretence of fearing fatigue, must be discouraged.

An excellent device for invigorating the circulation, especially for women, is to take the morning bath by sitting in warm water and having a bucket of cold water poured down the spine from the nape of the neck, and then being rubbed dry immediately with a rough dried towel.

The quality of the water used by atonic dyspeptics is a matter of serious consideration. Hard chalky water produces

flatulence, and frequently a grinding neuralgic pain in the epigastrium, so long as its use is persisted in; and the brighter and more sparkling it is, the worse it seems to agree. Chalybeate waters, as a daily drink, though the taste of iron be very slight in them, in a few months produce a peculiar debility and anæmia; even though at first, and when taken as a medicine for a short course, they had exhibited quite an opposite effect.

The best places of residence are high, dry, and bracing. The air of the Surrey and Sussex Downs, or such a combination of heather, fir-woods, and a sandy soil, as is to be found on Ascot Heath, seem the best specimens one can quote. It may be added that the last-named enjoys the advantage of a chalybeate spring, a short course of which will benefit those cases where atonic dyspepsia has induced scantiness of the evacuations peculiar to women or strongly marked anæmia. It agrees better than other forms of steel; which, as previously noticed, is seldom well tolerated in pure atonic dyspepsia.

The cookery in cases of this complaint can hardly be too simple. The appetite should not be tempted by savoury compounds, but by so preparing the article that its peculiar taste should be made prominent and attractive, and at the same time its texture made more soluble and digestible. The chapter on cookery in the first part of this work may supply a few hints, and the few recipes that follow are efforts in the same direction.

Duke of York's Universal Sauce.
(Pepys' Diary, February 10, 1668–9.)

Pound hard dried toast and a tablespoonful of peppercorns in a mortar, and boil them with an equal quantity of chopped parsley (or any other herb liked) and a dessert-spoonful of salt in a small teacupful of water. Add a teaspoonful of white vinegar, Tarragon vinegar, or lemon juice.

Relish for Fish.

Fish is made more digestible and has its flavour brought out by a few drops of lemon juice squeezed over it.

White Mayonnaise Sauce.

Put the yolk of a hard-boiled egg in a small basin; break it up fine with a wooden spoon, adding a pinch of salt and a pinch of pepper. Then keep on stirring briskly, while you pour in, drop by drop, the best sweet olive oil to the extent of about two dozen teaspoonfuls. With each eighth teaspoonful of oil, add a teaspoonful of white vinegar. Tarragon vinegar, elder vinegar, or otherwise seasoned vinegar can be used by those who like them; or a tablespoonful of French mustard may be added.

Boiled Flounders.

Put the flounders in a stewpan with a moderate quantity of boiling water, seasoned with a little salt; take off the scum, and continue the boiling ten minutes. Drain the fish on a fish-plate before the fire, and serve.

Rice Milk (Gouffé).

Blanch in plenty of water, 2½ ozs. of best Carolina rice;
Cool with plenty of cold water, and drain;
Boil 3 pints of milk in a 2-quart stewpan;
Mix the rice in the milk, and stir on the fire till boiling;
Add a lump of sugar and a small pinch of salt—say ¼ oz. of each;
Boil for an hour; serve.

Other milk soups—vermicelli, semolina, tapioca, &c.—are prepared in the same way, and form an excellent light supper.

Potato Surprise.

Scoop out the inside of a sound potato, leaving the skin attached on one side to the hole, as a lid. Mince up fine the lean of a juicy mutton chop, with a little salt and pepper, put it in the potato, pin down the lid, and bake or roast. Before serving (in the skin), add a little hot gravy, if the mince seems too dry.

CHAPTER IV.

GOUT AND RHEUMATISM.

THERE can be no sort of doubt that good cheer indulged in, either by himself or his ancestors, is the principal cause of every man's gout. Even where it is hereditary, the patient will generally be found to have assisted in bringing it on by his own love of evil things. The cases where it is traceable to lead poison, peculiar exposure to cold and damp, and a few other rare causes, need not trouble us much, as when they do occur their pathology is very obvious.

But if it is due to good cheer, shall we not be able to detect the identical article or articles out of whose pleasant substance is made the scourge to lash us? Shall we not be able, by excluding this, to enjoy the cup without the bitter drop at the end of it?

Those of our fellow-citizens who drink champagne, port, Madeira, sherry, Burgundy, London porter, are the most, of all the population, disposed to have gout. These liquors contain a peculiarly large proportion of alcohol; and so, exclaim the growers of light wines and total abstainers, alcohol is the cause of gout. But wait—observe the Glasgow labourer and the Irish peasant, and the Swede and Russ, who consume in the form of spirits six times the amount of alcohol that we do. They are quite free from gout.

Is it the acid in these drinks? Hardly—for they really do not contain any marked excess. Or the sugar? No—or sweetened tea would be equally noxious.

Or is it the peculiar combination of all those? Possibly. But I think a more rational explanation is that the classes who are rich enough to enjoy these luxuries are rich enough to enjoy other luxuries also. In fact, the cases of gout originating in the individual himself, without his being able to throw any blame upon his pedigree, occur in those who daily consume a larger quantity of nutritious food than their bodies require, or than can, by the assimilative powers they possess, be converted into useful muscle. Hence there is an accumulation of oxidisable matters which fail to attain the end of their chemical transformations, which do not become urea. So that there remains in the system an excess of them, especially of uric acid, convertible into urate of soda, the characteristic deposit in gout. Other contributors to the production of gout run hand in hand with the over-eating of meat, rather than with indulgence in fermented liquors only. Laziness can hardly be dissociated from gluttony—picture the latter, and you picture the former. And laziness can easily be understood to act in the same direction, by arresting the oxidation which is the result of due exercise. Immoral self-indulgence of another sort aids the development of gout by the exhaustion of the nervous system which it induces without corresponding muscular action.[1] And the same may be remarked of intellectual pursuits, a love for which has been noticed frequently to go along with gout, and which tempts the possessor to use his brain and let his limbs languish. Damp cold also, by weakening and retarding the circulation, helps in a minor degree the evil effects of gorging the digestive organs with nitrogenous food. Such seems to me the history of the origination of gout in the constitution.

The part played by fermented liquors seems rather the bringing on of the acute attack, of which almost all habitual sufferers can cite an instance. One man takes some port wine, which he has left off for years, and the same night is woke up

[1] Λυσιμελοῦς Βάκχου καὶ λυσιμελοῦς Ἀφροδίτης
Γέννηται θυγάτηρ λυσιμελὴς Ποδάγρα.—*Anthol. Græca.*

with the horribly familiar stab in the small joints. Another drinks a few glasses of champagne, and feels his foot twinge and swell before he leaves the table.

This consequence of an unhabitual excess is of the greatest importance in diagnosis. For we may lay it down as universally true that when a few glasses of wine or beer are followed soon by the inflammation of a joint or pain in a trunk nerve, the inflammation or pain is of a gouty nature.[1]

The views above stated as to the origin of gout can suggest but one line of preventive treatment. The children of gouty families should be brought up to a life of strict abstemiousness and muscular activity—'to scorn delights and live laborious days.' They must not compound for temperance in alcohol by indulgence in dainty meats, sweet pastry, soft beds, or idleness. At the same time I would not encourage them to an ambitious athleticism, to glorying too much in their strength. The result of this very often causes a reactionary depression at the period of middle life, which persons hereditarily healthy can resist, but which, in the case of those with ancestral tendency to gout, developes the disease.

From the earliest years, vegetables should form a considerable portion of the dietary. They should be furnished in great variety, so that the young may acquire a taste and a digestion for them. The various sorts of 'meagre' (or meatless) soups found in cookery books, and others which an inventive mind will suggest, should be habitual. Porridge for breakfast may be taken to any amount—what men are grown upon it in Northumberland and the North of Yorkshire! And in buttermilk will be found the best quencher of the thirst and nourishing digester of other victuals as well as itself. As they grow up, the young people should be impressed with the reason of this temperance, and urged to persevere in it, not only for their own sakes, but as a moral duty for the sake of their descendants. A man has a right to choose for himself one of two paths, but he has no right to

[1] Cyr, *de l'Alimentation*, part ii. chap. ii. article 1.

lead involuntary followers along that which seems the pleasantest at the moment.

If the tackling with the disease by diet and regimen be undertaken only after the development of it has taken place, the task is much more difficult, but not a fair subject for despair. Dr. Garrod, than whom none has sought more diligently for medicinal remedies for gout, or more advanced our knowledge of its pathology, says that 'if a gouty man could entirely lay aside his usual habits, and follow in all respects the dictates of nature, there would probably be little need to seek relief from medicine.'[1] By 'nature' must be meant the higher nature, reason or common sense; for man's desires are so perverted by the prejudices of education, and by moral and physical inheritance, that one cannot well trust to their guidance in the treatment of disease. But by rational management, it seems pretty certain that gout may be so far checked as will enable the patient to enjoy life, to live to his full term, and to hand down an untainted constitution to his successors.

An honest trial must be made, for three months at least, of an entire abstinence from all alcohol, except a little weak claret and water at dinner. If in that time weight is gained, or not lost, let the rule of abstinence be established for good and all.

If it is found that alcohol cannot, in the judgment of a competent temperate medical man, be left off, it will be best to take, as the habitual form of it, hollands and soda water. The quantity of spirit should never exceed a small wineglassful, and should be taken either at dinner, or, in cases of sleeplessness, at bed-time, but not at both.

Meat should be eaten but once a day. In other respects, the advice given in the last chapter as to food and cookery may be held valid for gouty persons as well as atonic dyspeptics. The obedience of the cook to orders is of paramount importance; and it will be well also to warn our patient not

[1] Reynolds' *System of Medicine*, vol. i. p. 875.

to be trying this or that dish as good for gout, at the bidding of officious friends, but to use his own judgment, usually sounder than theirs and also strengthened by self-interest.

The digestion of gouty persons is usually much improved by a winter sojourn in the dry warm air of the islands and highlands which get the benefit of Mediterranean breezes. I am unwilling to injure one place by mentioning another, and am disposed rather to enlarge upon the general qualities by which that great nurse of the civilisation of the human race, the Mediterranean, can earn still that gratitude, though we are out of her leading strings.

Without seeking for recondite cosmic influences, take the map of Europe, and consider the obvious characters of the waves and winds. The supply of fresh water brought by rivers to the Mediterranean is very much less than that which comes by the Gulf Stream from the Polar glaciers to the Atlantic. It is therefore salter, and would be salter still, and in course of generations all salt, were not a vast stream of Atlantic water flowing in through the Straits of Gibraltar. Being salter, it is more ready to remove moisture from the air, and less ready to part with it to the air under varying temperatures than the ocean which surrounds us at home. Its temperature also is more equalised throughout; there are not, as with us, hot and cold streams the vapours from which meet in the air and precipitate their watery burden on the earth. So that the atmosphere is, in the first place, clearer, or has a minor degree of hygrometric saturation, than in the British Isles, and in the second place is less rainy.

Of course there is rain, and of course there is east wind and north wind in Italy as elsewhere; but there is not that continuous depressing influence of the combination of a cold wind with a saturated air which we have. Then the avoidance of these black un-Italian days does not involve an imprisonment of a week or two in the house; and, in travelling, a change of residence of a few miles will often put you completely under shelter. Those who go abroad with an old-

fashioned guide-book, or take their ideas of Italy from the queer little pictures in blue body colour that used to adorn our nurseries, may be found grumbling, but those who have ever tried to travel in England, and have the faculty of comparison, will be well content. When they see the deep indigo horizon, the mark of extra saltness in ocean, which so generally bounds the traveller's landscape in Mediterranean lands, they will bless it for the clear air of which it is not only the indication but the cause.

The high temperature of the great body of water, so intimately intermingled with the land, preserves that of the air from the variations which we experience. This is of course most especially the case on the coast, but even inland it may be experienced. The sole exception is that of certain spots in the immediate vicinity of snow-clothed mountains, the air blowing over which in the early spring is much chilled. So that in such places as Florence, for example, a change of wind from a sea breeze to a Tramontana may cause a very sudden fall of the thermometer. But yet the even temperature of Italy as a whole, compared with England as a whole, must be allowed; its exposed climates are less variable than our exposed climates, and its sheltered nooks more completely sheltered than ours.

There is a higher amount and degree of sunlight than in our skies, so that all the chemical actions in the animal body must be intensified. A conspicuous evidence of this is the readiness with which the skin of the face becomes tanned even in the short and fresh winter days.

Again, the nervous system is much more awake to the effects of alcohol; so that instinctively less quantities are taken to produce the required effects. There are south of the Alps very few, if any, water drinkers; but there are also very few indeed who indulge in strong drink. One does not 'feel to want it.' A single glass of Orvieto or Capri there seems to produce as much exhilarating relief as an allowance of the domestic port or sherry containing five times the quantity of

spirit. And not only is it felt superfluous, but positive discomfort is felt as the immediate effect of what appear to a stranger moderate doses of alcohol.

A corresponding observation may be made in respect of animal food. Less is hankered after by the invalid, and, moreover, a less rich or fat meat than in England. Without a failure of appetite, he yet feels satisfied with a smaller quantity.

In Italy and Spain sleep is less profound, and easier shaken off and dispelled by slight disturbances. This light and short repose is soon found to be the custom of the country, and the mind being set at rest is satisfied with it.

There are no lands where there is so much variety to divert the mind from preying on its own thoughts as these. It may be doubted whether the past, the present, or the future offers most to attract the attention. If none of the strata of historical relics interest the traveller, he can still hardly help feeling their present picturesqueness, and the loveliness of the forms and colours by which they are surrounded; while to the social or political observer the spectacle of a naturally intellectual and industrious people, long restrained by untoward circumstances, and now at length bursting out for good and for evil into new life, is unique. He desires to live, were it only to see what becomes of them.

Now reflect how these various agencies may act on the human body. The dryness of air, without excessive heat or cold, renders it unnecessary for mucous membranes to put on their slimy coats of mucus. They are in a more active condition for the work of absorbing oxygen, digesting, extracting nutriment or water, or whatever else they are required to do. They are filled with blood, and pass it on rapidly with its fresh burden of renewed life to the tissues. So that the disintegration and removal of the effete products that cause gout is actively promoted.

The evenness of temperature renders it possible for all, invalids included, to be a great deal in the open air, and take

the exercise which has been described as so essential to those of gouty constitution.

The action of sunlight in reddening the blood is familiar to even the poets. The etiolated plant of northern climes is quickly by it rendered crisp and hardy, and the same effect may be inferred to take place in the etiolated animal. It is of great importance in atonic gout.

Spite of all the arguments of philanthropists, alcohol will always remain an evil necessity to brain-working populations in northern climes. I do not know but that its occasional use is a necessity in all climes. But certainly a little goes further in the south, and therefore less is requisite, if any. Thus is avoided the temptation to the slight daily excess, which is the most dangerous temptation to the gouty.

It is not alone on the passing traveller that Italy's special (I will not call it '*fatale*) dono di bellezza' acts. There is scarce a peasant who is not proud of the external aspect of his country,[1] and I am not at all sure that this feeling is not as powerful an assistant as any material agency in enabling him to live and flourish contentedly on what would starve or drive into melancholy madness an English convict or pauper. Do not set down this as sentimentalism or artistic whim. Consider how continually the converse of the experiment is impressed upon us by blue-books and sanitary reporters, who are constantly repeating that a monotonous colourless life, such as finds its exaggerated type in solitary confinement, renders absolutely requisite an excessive quantity, and under other conditions an unwholesomely stimulating quality, of food, to preserve in health the mind and body, although no complaint is made by

[1] A genuine Italian will often prefer his country's praises to his own in whimsical ways. At Salerno we commended a soufflé to a waiter, who was the author of the delicacy: 'Call that well made?' said he; 'why every little lad in Salerno can make as good a one—Si, signori, ogni ragazz' di dieci anni nella città—and there are thirty thousand inhabitants!' Untrue of course, but patriotic.

the sufferer. Why then should it not be true that the daily life among picturesque and cheery scenes saves the victuals, although the benefited are ignorant of their blessings?

But it is indubitably for the stranger, as Filicaja complains in his touching sonnet, that this banquet of sweets is principally spread. The temporary resident profits more than the native by the fair scenes and their associations, by their ennobling and rousing effect on the mind, and through the mind on the body. They have for him the additional charm of variety and novelty.

I have dwelt somewhat lengthily on the effects of a warm tonic climate in this chapter, not because its benefits are exclusively or even principally confined to the gouty, but to finish up the subject as a whole, and be enabled, when speaking of other diseases, merely to refer to it.

The most expedient form of exercise for a gouty person is riding, as he will not be deterred from it by a little tenderness of foot or ankle so often as if he only walks.

Gouty persons suffer frequently from relaxed, sluggish piles, especially when travelling. The best regiminal treatment for them is to take some cayenne pepper with food as an astringent to the mucous membrane of the rectum, and to not only wash the external orifice, but to dash quite cold water against it till a glow of reaction is felt in the bowels, every time after the bowels have been opened. A full supply of green vegetables in the dietary should be secured.

I cannot recommend that the malaise which gouty persons often feel for a considerable period, no better and no worse, should be put an end to by a debauch productive of an acute attack. It possibly may hasten the advent of the attack, but there is no proof of its bringing the end of it any nearer. Whereas other treatment, which it is not the place to discuss here, accomplishes both objects, and gives a chance of escape altogether.

Timid sufferers will sometimes demand spirits 'to keep the gout out of the stomach,' as they say. Now real gouty

gastritis is a very terrible malady. I had once the opportunity of examining the stomach of a debauchee who died of it, and found the mucous membrane in a state exactly resembling that produced by oxalic acid. This, however much to be dreaded, is not likely to be kept off by alcohol. But in point of fact such affections of the stomach are very rare, and when they do occur, do not appear to be retrocedent, or to arise from repulsion of the external inflammation into the viscera, but to be an extension of the morbid process, and to bear the same relation to gout that pericarditis bears to rheumatic fever. So that one does not see how anything but harm can be done by alcohol.

In spite of its rarity, it is curious how much patients talk about 'gout in the stomach.' I have often thought that medical men must have called by that name attacks of acute dyspepsia from indigestible food, or of windy spasms, or of gastric neuralgia. These last are likely enough to happen to the gouty, but differ nowise in their requirements from the same ailments occurring in others.

The regimen of Rheumatic Gout does not vary except in the details, which must be suited to each individual case, from that of Gout.

Chronic Rheumatism, or *the rheumatics*, seldom need lay a patient up, if he will adopt the simple dietetic expedient of eating a certain quantity of fresh mustard with every meal, much if he is worse than usual, a little if he is pretty comfortable. He should avoid bathing in cold water, which will tend to derange his digestion.

We must, however, carefully make the diagnosis in each instance between chronic rheumatism, which is a disease of the fibrous tissues, and neuralgic pains, which run along the lines of the nerves. The latter are not unfrequently benefited by cold water, and are aggravated by warmth, especially by a hot bed. Medicinal treatment is here essential.

CHAPTER V.

GRAVEL, STONE, ALBUMINURIA, AND DIABETES.

URINARY DISEASES form a separate class for the consideration of the dietician, because in them we have to keep in mind not only what is likely to affect the general health, but also what will affect the kidneys and bladder specially, by producing a secretion capable of exercising a locally deleterious action.

Uric acid forms the nucleus of the great majority of urinary concretions, and many entirely consist of it. The small red grains, like cayenne pepper, and the brown lumps of gravel or stone, are all of considerable hardness and of smooth exteriors, so that their presence is often unfelt, till they make themselves evident, either by passing out into daylight, or by concreting together and becoming large enough to be a mechanical impediment. The great object in treatment must be to prevent the deposit of uric acid in the renal secretion; and when the tendency to it is once proved, not to await the advent of symptoms, which only arise at late periods of the disease.

Uric acid is deposited only when it is in excess. Excess of uric acid in the system is, if not absolutely identical, at all events closely related to the diathesis of gout. So that all that has been said about the regimen of that disease may be applied without any reservation to this contingency also. The strict observance of it is the more urgent in the degree that stone is the more painful and dangerous of the two.

Oxalate of lime is a substance whose very presence in the urine is decidedly abnormal and morbid. It may be derived

by occasional accident from some article of food, such as tomatoes, or rhubarb, or sorrel, without inconvenience accruing; but when not to be accounted for in this way, it evidences a departure from health, and the persistence of its deposit leads to a most painful form of stone. Its shape is sharp pointed crystals, and these grow together into knobby masses, which, whether from their form or other unexplained causes, give rise to great agony in the parts they come into contact with. It is of great moment, therefore, to detect its existence in the urine at an early date, so as to anticipate the evil results.

Oxalate of lime is often found in children who live in the country and have been under-fed. In this case it would appear to arise from their eating an excess of acid fruits and bad vegetables, and drinking hard unboiled water. Chemists tell us that citric, malic, and other organic acids distributed through the vegetable world, are liable to conversion into oxalic; so that it is not necessary that it should be naturally a constituent of the food eaten, but may arise during its fermentation or digestion.

It also is formed in the urine of adults in consequence of exposure to damp cold, deficiency of fresh air, and a low monotonous diet. The debility arising from frequent attacks of gout also induces the formation, so that it appears mingled with urate of ammonia or soda, easily distinguishable from that amorphous deposit by the pointed octahedral shape of the crystals under the microscope. The persons in whom I have found oxalate of lime have been of a nervous sensitive constitution, and those of the male sex have frequently suffered from nocturnal seminal emissions. They always feel much the irritation of the neck of the bladder induced by the morbid urine.

The indication afforded by the formation of oxalate of lime is to secure a generous animal diet, warm clothing, fresh air, gentle exercise and rest; but, above all, that repose of mind the want of which is a prominent cause of the indigestion.

Rhubarb, sorrel, apples, pears, and in short any raw fruit and vegetables, should be avoided. Water-cresses and lettuce are the least objectionable, as they are sedative to the urinary organs and prevent a scorbutic condition of the blood. A small quantity of old spirits and water at meals does not in general disagree.

Phosphatic salts are a natural ingredient in the urine. The healthier a man is the more of them does he excrete. In the normal condition of acidity of the urine they are quite dissolved. But when from the irritating presence of a foreign body, such as a uric acid calculus for instance, the surface of the mucous membrane of the urinary apparatus becomes so alkaline that it makes the water alkaline also, then the phosphatic salts are concreted into crystals and solid masses. Thus, the uric acid calculus, or other foreign body, becomes coated with a layer of a nature quite different from its own. Idiopathic or constitutional inflammation of the bladder and kidneys may also deprive the urine of its healthy acidity, and cause phosphatic gravel to concrete without any visible nucleus to concrete upon. But I cannot say I have seen the same happen from the temporary alkalinity dependent on taking soda, magnesia, or potash in the medicine or diet. However, where there is a fear of this result, in case of an alkali being required, it is wise to use the more diffusible one, ammonia.

The treatment of the morbid condition here alluded to is wholly surgical. The mechanical removal of the cause of irritation is imperative where it is possible. Where it is impossible, the special treatment of the local inflammation causing it is the only rational procedure.

Gravel formed of the strange greenish substance called '*cystine*' is very rare. I have met with only one person who has ever passed it, and he seems to be nowise deteriorated in health. From the large quantity of sulphur it contains (26 per cent.) it would seem to be formed by the decomposition of some animal matter, perhaps solidified mucus.

Chronic Albuminuria, or Bright's disease of the kidneys,

is a complex state, the complication of which involve several conditions with separate bearings on the choice of the most appropriate diet and regimen.

The essential feature in Bright's disease is an imperfect nutrition of the smaller blood-vessels, by reason of which they lose their elasticity and tone, become thick and friable, are obstructed, and are unable to supply the glandular structure of the kidney with the blood for depuration. Hence a retention of the urea which should be cleansed out from the circulating blood. The blood thus fouled fails to absorb sufficient oxygen, is imperfectly aërated, and cannot renew its red particles. Hence, with the retention of urea there is anæmia also. By the force of the heart the fluid is still driven along, but it meets obstruction, instead of help, in its course from the action of the capillaries; and there ensues an exudation of the easiest exuded, that is the serous, part of its substance into the nearest open space. Hence the urine, at the same time that it lacks the urea which it ought to carry away, is loaded with albumen abnormally abstracted from the circulation.

The object aimed at by the dietician should be to supply the nutrient organs with aliment which is the most readily and rapidly convertible into blood and tissue, namely, digestible animal food in frequent moderate quantities. He will also feed the anæmic blood with iron, and in his use of drugs will choose such as contribute to rectify the deficiencies of the digestion. Bearing in mind the fouling of the blood with effete matters, he will advise a copious use of aqueous drinks, which flow out readily by the kidneys, carrying with them such constituents of the diseased body as are soluble in water. Especially will he carefully disabuse the mind of his patient of the notion that drinking water leads to dropsy, and that the thirst should be thwarted on this ground. The warning is very necessary; for an albuminuriac hardly ever escapes at least some subcutaneous collection of fluid in the face or legs; and if his doctor has previously been urging on him the

use of diluents, he accuses them of having caused the symptom. In point of fact the best and only thoroughly safe diuretic for the relief of albuminurious dropsy, is water, and it is also a valuable preventive.

In disease of the structure of the kidneys, and especially in albuminuria, it is obvious that harm must be done by alcohol. There is no thoroughfare through the kidneys for the natural amount of urea and phosphates, still less for the alcohol. Thus the ordinary safety-valve is shut up. In this condition coma is often brought on prematurely by neglect of the warning voice of the sensations. Albuminuriacs will always remark that they feel stupid and sleepy after their accustomed amount of wine, and this should be a hint to their medical attendant to leave it off, instead of encouraging them to persist on the plea of weakness, as is often done.

An additional reason in behalf of abstinence is that albuminuria, at least in its chronic form, indicates a degenerative diathesis, which has been already pointed out as one of the bad influences upon health of alcohol. Whether alcohol or cold be the sharper blade of the shears so apt to cut short life's thread by Bright's disease, I care not greatly, inasmuch as it cannot be questioned that both of them have that tendency. It is their union which is so irresistible a foe to the poorer working classes who come to hospitals, and it is the avoidance of that union which protracts the lives of our wealthy patients. I cannot repent of including albuminuria with its attendant evils among the diseases caused by alcohol, and I very much object to the gin and whisky punch, the hot grogs and the spirituous diuretics which I have known albuminuriacs advised to drink. If they must have the liquors, let them at any rate indulge in an occasional bout and be done with it, and not consume their poison in its most fatal form of small repeated doses. Warm diluents are just as good diuretics without alcohol as with it.

There is considerable difficulty in persuading albuminuriacs to persist in a systematic milk diet; but if it could be

managed, I am persuaded nothing would give a better chance of putting a stop to the progress of the lesion.

In *Diabetes* certainly life is prolonged, and the risk of the intercurrent maladies diminished, by a diet from which sugar and articles which form sugar are, as far as practicable, excluded.

M. Bouchardat, Professor of Hygiene at the University of Paris, gives the following list of eatables whose chemical composition makes them injurious to diabetics:—

Sugar;—

Bread of any kind, or pastry;—

Rice, maize, and other starchy grains;—

Potatoes, arrowroot, tapioca, among root products;—

Sago, among piths;—

Among manufactured starches, macaroni, vermicelli, and semolina;—

Of vegetable seeds, peas and beans of all sorts, and chestnuts;—

Radishes, turnips, beetroot, carrots;—

All preserved fruits, apples, and pears;—

Honey, milk, beer, cider, sweet and sparkling wines, lemonades, and suchlike sweetened acid drinks.

Happily the list of permissible articles of diet is somewhat longer, and might easily be extended by the introduction of nutritious eatables kept out of European markets by want of demand. The diabetic may eat without fear—

Meat of all kinds, brown or white, boiled, roast, or grilled, and seasoned with any sauce pleasing to the palate, provided there be no flour or sugar in it;—

To the curious gourmet, affected with diabetes, it may be mentioned that Professor Bouchardat especially commends the flesh of carnivorous animals, and advises their trying cat, dog, and fox. Probably larks, robins, and ducks will be more to their taste. The liver, however, should not be eaten, and by removing the fat a great deal of the rank flavour of the carnivora is avoided;—

All sorts of fish, shell-fish, and lobsters;—

Eggs;—

Cream and cheese;—

Spinach, endive, lettuce, sorrel, asparagus, hop-tops, artichokes, French beans, Brussels sprouts, cabbage (the last 'very good with pickled pork or bacon,' says the good-natured professor);—

Salads of cress, endive, American cress, corn salad, dandelion, lettuce, with a full allowance of oil and hard-boiled eggs;—

Fresh vegetable gluten, *i.e.* dough with the starch washed out, may be made into an agreeable dish with grated Parmesan or Gruyère cheese and butter;—

Anchovy and Ravigote butter (see Gouffé);—

For dessert, olives. On high days and holidays, when the patient has begun to improve, some fresh summer fruit, of course without sugar.

The wearing hunger may be much appeased by chewing cocoa beans.

For drink, a bottle and a half of good claret or Burgundy may be taken in the day. Those who prefer it may take instead brandy and soda-water, one part of the former to nine of the latter. Fresh beef-tea is a capital quencher of thirst.

Coffee with cream.[1]

It may be observed that several of these last-named victuals are not entirely devoid of sugar, starch, or inosite; but the quantity is so small that they may be conceded as a variety, and are not considered dangerous by our chief authority on the subject who has been here quoted. The *menu* has not been improved by any of the subsequent writers on the subject, whose efforts have been mainly directed to the pharmaceutical treatment of the disease.

Diabetic patients should always chew slowly, eat often but moderately; and drink should be taken in the same fashion.

[1] Bouchardat, *Du Diabète sucré*, Paris, 1852.

They will assist digestion much by wearing a flannel belt round their waist next the skin.

They should take a great deal of gentle exercise in the open air.

The digestion will also be improved by quinine and strychnine, to which may be added, with the approbation of the dietician, cod-liver oil. The action of soda, also, in augmenting the secretion of gastric juice, may be brought into play by the dietetic employment of Vichy water.

Among the substances forbidden to diabetics, is unhappily included that which is proverbially the one thing needful, 'the staff of life.' Bread is the article of diet most prominently starchy and deleterious, and at the same time the most difficult to deny. To get over this difficulty, M. Bouchardat devised a sort of sham bread made of gluten. But it is agreeable neither to the eye nor to the taste, and the patients on whom I have tried it have preferred going without bread altogether.[1] A much more palatable substitute is proposed by Dr. Pavy in his well-known work on Diabetes—namely, cake made of powdered almonds and eggs.

However, my own opinion is that we do not act wisely in enforcing a diet which is really intolerable to the patient. The object to be gained is to conciliate the stomach, appetite, and fancy into taking the greatest possible amount of animal food and oleaginous matter—in fact, to assimilate the patient, as much as possible, to the Esquimaux and Pampas Indians, who have nothing but water and beef, beef and water, from the cradle to the grave. And if he eats the heartier for having a biscuit, or crust, or glass of porter, or even a forbidden vegetable with his meals, it is better to give him his way than to tempt him to break through all rules altogether by playing the tyrant.

There is a doubt felt how far the patient's unnatural thirst ought to be gratified. Abstinence diminishes the quantity of urine of course. But is that an advantage? It

[1] *Lectures Chiefly Clinical*, lect. xxxviii.

would seem better, if the blood gets loaded with sugar, as analysis proves it to be, for the foreign ingredient to be washed out by an ample outflow, than for it to remain at the risk of poisoning the tissues. It will be found that the thirst is closely proportioned to the amount of sugar requiring expulsion. When the diet is changed from starchy to meaty food, much less is drunk, and much less evacuated by the kidneys, although no restriction has been laid upon the appetite for liquids. I do not, therefore, check patients in drinking as much diluent as they wish.

In all diseases which affect the mucous membrane of the urinary apparatus, such as the irritation of a stone in the kidneys, ureter, or bladder, an enlarged prostate, gonorrhœa, &c., malt liquors are peculiarly deleterious. They increase the secretion of pus, and often bring it back again when it has stopped for several days. This is not to be accounted for by the alcohol therein contained, since neither weak spirits and water nor sound claret has the same effect; but it must arise from some peculiar condition of the transformed malt forming an irritating ingredient in the water.

CHAPTER VI.

DEFICIENT EVACUATION.

Costiveness must be regarded as a disorder of the whole system, and not of the intestinal canal alone. The first object of treatment should be to relieve the body of the presence of excrementitious matter, the predominance of which in the blood is shown by the dingy, feculent tint of the complexion, the sluggish thoughts, the headache, and the slow circulation. Purgatives, then, may judiciously be used to commence with; for the immediate relief they afford to the feelings of discomfort is great. But let not the relief be set down to the mere 'clearing out the bowels;' it is the cleansing of the blood which is the real aim of the remedy, and the real cause of the relief. An inspection of what comes away shows that it has been newly made; it is fresh bile and other constituents of recent fæces, not of those which have rested long in the canal.

Nothing is easier than thus with a vigorous pill and draught to drive away, as by a charm, the patient's discomforts; and he is ready enough to cry out that no more is wanted. But what is the consequence of leaving off treatment? The renewal of the blood and tissues not having had time to regain its original activity—there not being enough new-made blood to carry on vigorous life—the effete materials again collect, and the disease takes a fresh start. Again and again the coarse expedient is called for, and at last fails to effect its object of giving relief.

To avoid this evil consequence it is prudent to administer no quickly-acting purgatives which completely empty the

abdominal canal, but rather such as cause a gradual increase in the solid matter of the stools. Aloes and rhubarb are the best evacuative; and I find it also beneficial to combine with the chosen drug some resin, which acts as a tonic to the mucous membrane, and prevents the exudation of serum and mucus. Two or three grains of aloes-and-myrrh pill, every night, will in a week produce all the good effect of strong purgation; and it will produce the good permanently instead of merely for a time.

All superfluous food of the sort that has the property of arresting evacuation must be left off. Wine, beer. tea, and coffee must, on this account, be excluded from the dietary; and milk, cocoa, whey, soda-water, Seltzer-water, &c., substituted for them.

Water is a very ready remedy, and certainly a very rational one, when the evacuation by destructive assimilation is deficient. The experiments of Dr. Böcker and of Dr. Falck [1] show the increase of interstitial metamorphosis by this agent to be in close proportion to the quantity taken; and all who have heard or read of the agreeable sensations of patients during their submission to the 'Water-cure' cannot question its capability of removing matter from the tissue. Herein lies its strength; for, as Dr. Böcker observes, 'the demand for new tissue, as expressed in the sensation of hunger, keeps pace exactly with the extent of the metamorphosis.'

A much less amount of water-drinking than is involved in a hydropathic course will often be of great service. Let the patient take, the first thing of a morning, a tumbler of water made spicy by a few cloves which have been placed overnight in the tumbler and had boiling water poured on them—a weak clove-tea in fact.

Warm hip-baths are also of great service, and can be borne from the first even by those reduced to extreme anæmia and lifelessness. Afterwards a cold douche bath, administered by

[1] *Zeitschrift der K. K. Gesellschaft der Aerzte zu Wien*, April, 1854, and *Vierordt's Archiv*, i. p. 150.

sitting in warm water and having a bucket of cold water poured down the spine, or squirted against the loins with a garden syringe, is of essential use, by actively promoting the life of the skin and capillaries. Raising the specific gravity of the water by the addition of salt prevents the chill which fresh water is apt to impart.

Green vegetables, of which spinach is the completest specimen, should be freely eaten, and summer fruits. Porridge is an excellent breakfast; and brown bread, so that it be not new, is beneficial as supplying a good quantity of material for the bowels to act upon. Watercresses and dandelion are useful, eaten raw, and the watery extract from the root of the latter forms a suitable drug to assist the digestive organs. Horace recommends lettuces, and with some reason. Both they and spinach may be made into soup.

Roast apples and stewed prunes are much better suited than pastry as a second course for the patients we are now considering. Stewed prunes can also be taken with meat. Figs can be eaten either cold or in a pudding.

Bacon, the most soothing of fats to the digestive canal, eaten at meals, or two teaspoonfuls of salad oil taken at bed-time, prevent that drying and hardening of the contents of the bowels which causes much of the inconvenience, and they also augment the activity of the liver.

Red wines should be avoided by the costive; they cause piles. The best of the white sorts are Chablis, Sauterne, and Capri.

A careful diagnosis should be made between deficient evacuation (as above described) from costiveness, and that which depends on anæmia or old age.

In anæmia there is almost always joined with it (in the female sex) a deficiency of catamenial discharge. It is scanty, pale, or even altogether absent. This is an indication for the use of iron, phosphatic salts of lime, and cod-liver oil. A diet drink of cinchona is especially useful in such cases.

Porridge.

Always use the coarsely ground Scotch oatmeal. Mix two tablespoonfuls of it with a small teacupful of cold water till it is of uniform consistence. Then pour in a pint of boiling water, and keep boiling and stirring it for forty minutes. It is then fit to eat, but may be kept simmering till wanted, if a little more water be added as the other steams away. It should be served in a soup plate quite hot, and cold milk added to reduce it to an eatable temperature.

Brown Bread.

One of the most useful purposes to which to apply brown bread is to make it into bread sauce, in the manner before mentioned for white bread. Mixed with tomatoes, it makes a capital sauce for costive persons.

Brown bread biscuits are also eligible.

Oatmeal Flummery.

Take crushed Embden grits in proportion to the quantity required. Put them into a broad pan, cover with water, stir up together, and let stand for twelve hours. Then pour off the water so long as it runs clear. Add fresh water, mix, and let stand twelve hours more. Repeat the same process a third time. When the oatmeal has been thus macerated thirty-six hours, strain it through a hair sieve and boil it, stirring vigorously till it is quite thick. Pour it, to cool, in a dish, and eat it cold with milk, or a little wine and sugar.

Spinach Soup.

Pick all the stalks from 1½ lb. weight of fresh spinach; wash it and chop it; put it in a 3-quart stewpan with four ounces of butter; stir it over the fire for five minutes; add an ounce of flour and stir again for three or four minutes. Then stir in two quarts of chicken broth till it boils. Simmer it on a cool stove for half an hour, and add a small teaspoonful of cream. Serve with it some pulled bread fried or baked.

Endive or lettuce soup may be prepared in the same way.

Lettuces with Gravy (Gouffé).

Take 8 round and full cabbage-lettuces; trim off all the outside leaves; wash and blanch for 10 minutes; cool them well; squeeze the water out; cut them in two; lay them open on a dish, and season them with 3 pinches of salt; tie the halves together, and put in a 2-quart stewpan; cover them with broth and add 2 gills of stock pot fat, 1 faggot,[1] and 1 onion with 2 cloves stuck in it; place a round of paper on the top, and simmer for 2 hours; when cooked, drain on a cloth: untie and open the lettuces again; cut the stalks out, and fold the leaves round, giving to each piece an oval shape, about 3 inches by 2 inches, and dish them in a circle.

Reduce 1½ pint of household gravy to half the quantity; pour it over the lettuces, and serve.

Thin slices of crumb of bread, cut to the shape of the lettuces, can be put in the intervals between the lettuces.

[1] A faggot should contain a small handful of parsley, a sprig of thyme, and a bay-leaf. It should be tied up with string, so that none of the leaves break off in cooking. It is a perfectly wholesome seasoning.

CHAPTER VII.

NERVE DISORDERS.

§ 1. Hysteria.

It has been authoritatively stated that 'the physician can do but little for one who is born hysteric; *i.e.* for one whose disease is but an exaggeration of her habitual, constitutional state.'[1] I cannot agree in that sentence, for I am sure that a judicious medical adviser may very often give, even to such a born sufferer as above described, advice which will enable her not only to be comfortable herself, but to be a useful member of society. And of such advice one point of dietetic regimen will always form a part in every single case—'Let no fermented or spirituous liquid ever cross your lips.' I have not a shadow of a doubt that at least one-third of the subjects of hereditary hysteria we come across, would never have developed into the declared disease had they observed this abstinence.

Hysteria has already been spoken of, in a chapter concluding the Second Part of this volume, as kept up, if not originally started, by alcohol. This is most especially true (according to my observation) of those irregular chronic forms of the ailment where there are few, if any, stormy paroxysms or convulsions. I have been surprised to find how often a total abstinence from fermented and spirituous liquors is followed by a restoration of the invalid's strength. That incapacity for exertion, which made a witty hysteriac say the other day that she should take '*Non possumus*' as her motto,

[1] Reynolds' *System of Medicine*, vol. ii. p. 325.

vanishes as if by magic, and your patient cheerfully adopts all the further means for her cure.

It is not here meant to be implied that hysteria in all cases, or even in any large proportion of cases, is brought on by tippling. Such an idea is quite negatived by the age and social condition of most of its victims. Compared with hereditary and educational influences, with mental depression, with starvation, with tea-drinking, with pelvic irritation, with dyspepsia, the experience of the ailment (as collected by M. Briquet [1]) shows the evil power of alcohol to be inconsiderable in the number it thus immediately affects. Still I cannot but think that if they had been made from clinical records in this country, his statistics would have assigned more importance to it as an originating influence. What we are concerned with now, however, is its injurious action on the disease already established. Of that I have no doubt. And I find a full explanation of the fact in the innutrition of the nerve tissue which was illustrated by experiment in the former chapter on 'Alcohol.'

There is in the treatment of hysteria a difficulty of diagnosis which especially concerns the use of alcohol, namely that arising from the frequent occurrence in the same person, and at the same time too very often, of some variety of neuralgia, such as intermittent tic, brow ague, and stitch in the side, which when they occur alone are benefited by high living and port wine. A trimming treatment is necessary here, but if the hysteria predominates, I strongly object to the employment of alcoholic stimulants.

The momentary relief afforded by the poison puts a mountainous difficulty in the path of those who would give their clients advice grounded on the truths established by science. We feel ourselves so weak, that some have swallowed the fallacies of teetotalism, so as to be able to 'answer a fool according to his folly.' Others of us, to keep one another up by mutual moral support, banded together two years ago, to

[1] Briquet *sur l'Hystérie.*

sign a protest against the misuse of alcohol in medicine. And I do think that the latter movement has had considerable effect in rousing the consciences of medical men to the meanness of conciliating patients, especially nervous patients, by allowing them to drown pain in what is a final poison.

The best way of breaking off the habit of yielding to the perverted sensation which so insidiously cries for alcohol, is immediately and altogether to relinquish it. Terrible sometimes is the struggle, yet it is a bracing and ennobling conflict; whereas the long-continued daily annoyance of giving it up little by little is on the whole quite as painful, and is often enfeebling to the mind. Moreover, courage is likelier to give way in a month than in a day.

A generous nitrogenous diet is essential in the treatment of hysteria. Meat should be eaten at breakfast, and it will be found to be less repulsive and easier digested if the internal viscera be previously braced up by a shower bath, or a cold douche to the spine. The best drink is milk and soda water, in the proportion of about half of each.

The hysteric temperament will in the female sex sometimes cause functional derangement of the periodical evacuation, either in excess, defect, or painfulness. As a rule, all local treatment is to be avoided, and the attention of the patient withdrawn from what is, in point of fact, a mere accidental symptom to a due regulation of the diet and regimen. And the same rule will apply to irritation of the urinary organs.

Pollutio nocturna in men also often arises from the same cause. Excluding the cases where this annoyance depends on worms or piles in the rectum, it will be found that nine-tenths of the subjects of it come of hysterical families, and may be relieved by anti-hysteric treatment. If it is associated with *impotentia coram fœmina*, the diagnosis of the temperament is the more easy. Here again local interference is most pernicious.

§ 2. Delirium Tremens, Alcoholism.

Nobody but a whimsical doctrinaire would propose to relieve physical phenomena really similar in essential matters to such as are caused through a drug, by administering an additional similar stimulant. No man of plain, unclouded common sense does so in words; but in act, the vulgar drunkard looks upon himself as performing a feat of wisdom, when he takes 'a hair of the dog that bit him.'[1] What this does (if it is strong enough to do anything) is to stop the painful process of eliminating the toxic agent. It is equivalent to an attempt to soothe retching when a man has swallowed an ounce of laudanum. The retching may be soothed certainly, and by an additional dose of the laudanum itself; but the sufferer is all the worse in the end.

As a remedy for drunkenness some have employed the agency, supposed to be antagonistic to alcohol, of sulphuric ether. It has been useful in dead-drunkenness (coma), and those who have indulged in secret will sometimes steady themselves and cover the airy evidence of their brandy dram with an odour which hopes to pass as an article of materia medica. I suspect the proceeding differs in nowise from that above named. The safest and quickest, though not the pleasantest, cures for the remorse of a guilty stomach, are patience and diluents. Let the sick man, if he still on principle adheres to his 'hair,' make it as little a one as possible, and drowned, as completely as possible, in the antagonistic fluid, water; and let the patience be seasoned with repentance; and then he may calculate safely on being no worse in the end for his temporary folly. In this case what happens, probably, is a retention of effete matters, especially in the

[1] *Si nocturna tibi noceat potatio vini,*
Hoc tu mane bibas iterum, et fuerit medicina.
'If overnight's debauch does hurtful prove,
A glass next morning will your pains remove.'
Sanctorius.

nervous tissue, proportionally greater than that noted in Experiments I., II., and III.,[1] in the ratio of the amount of alcohol held in the body at once—a retention followed by a copious evacuation, not only of the retained matters, but of the results of an increase in destructive assimilation. Hence a feeling, not of satisfaction, as when retained effete matters are got rid of by a timely purge, but of painful exhaustion. The body is actually lighter, as noticed by Sanctorius, but, from weariness, feels heavier. After the evacuation has gradually ceased, there is no reason to doubt that the body quite recovers itself, for temporary functional disturbances, when time is allowed for full completion of the crisis, leave no organic traces.

So that the occasional (say 'monthly' in deference to Sanctorius) drunkard, if he also takes a monthly bout of penitence and temperance, probably does not shorten his days. But that he thereby lengthens them or gladdens them, implies a condition of things that never need voluntarily be submitted to in Europe. It implies a monotony of surroundings which will thank a misery for a change, and clock-like habits unbroken by the due mental and bodily stimulants of natural life. It implies an existence approaching to that of the Pitcairn Islanders, the descendants of the crew of the 'Bounty,' who are described by their rare visitors as having eliminated from their little community all that could lead to sorrow or irregularity, without diseases and without doctors; and yet they rapidly grow old, and soon after forty are calmly gathered to their forefathers, simply because they have nothing else to do. Their last sexagenarians were some survivors of the original mutineers. This is an extreme case, but we sometimes come across examples of too monotonous an existence even in civilised life, as, for instance, in the families of respectable persons, engaged in safe trade. Amusement and ambition, from want of use, fail to attract them, and considerable ingenuity is often required to make them care for anything.

[1] See pages 221, 228, 230.

Dramatic entertainments, either on stage, platform, or pulpit, afford the readiest resource; but of course any hobby in which the patient may himself act a part, is much more valuable. All these are much healthier stimulants than alcohol; and, moreover, whatever sanatory merits intoxication might have, the moral objections to it would outweigh them all, and in spite of the authority of Sanctorius and our gratitude to him as a physiologist I hope I shall never again hear anyone advised to get drunk for the good of his health.

Delirium Ebrietatis, 'mad drunkenness,' is the systematic name given to a form of intoxication, whose peculiarity depends on the diathesis or temperament of the sufferer's brain. While most grow stupid, quarrelsome, or maudlin under drink, some (with probably a latent taint of insanity in them) have a dangerous tendency to grow furious, and to have delusions which still further excite their fury. The affection is, in fact, a sort of mania, exhibited only during the presence of alcohol in the blood. Indeed, in Dr. Darwin's days, it was apparently considered true mania; and as bleeding was usual in mania then, it was practised for *delirium ebrietatis* also, though not with the approbation of that far-sighted physician, who, in this and many other things, was much in advance of his generation. He says, 'Venesection, I believe, sometimes destroys those who would otherwise have recovered in a few hours.'[1] He recommends emetics and watery liquids, which are antagonistic to alcohol, and therefore I presume he would join me in classing this among the diseases where alcohol is to be avoided. It is important to distinguish it from madness, in which alcohol is sometimes useful, as will be afterwards noticed. A few hours will certify the diagnosis, as *delirium ebrietatis* is soon recovered from, unless the patient be a constant tippler.

Delirium Tremens—or 'the horrors'—is the familiar and distinct form of disease of the nervous system arising from the long-continued deleterious influence of alcohol on health.

[1] *Zoonomia*, ii. 1, 7, 3.

Its pathology has already (p. 234, &c.) been assigned to an arrest of the renewal of the tissues, especially those which contain phosphorus—an arrest found by experiment when even small quantities of alcohol are ingested, and apparently directly proportioned to the continuousness of the ingestion. It is distinct from *delirium ebrietatis*, not only in its symptoms, which are too well known to need repetition, but in the fact that these symptoms seldom, if ever, follow immediately on an unusual excess. It is true that a man may be mad-drunk, and after a time drivel off into the horrors, if he is an habitual dram-drinker; but he does not, as a rule, get struck with the horrors during his debauch. Indeed, this form of disease, as often as not, is the consequence of a sudden omission of the customary stimulant. It is on the ground of this last-named fact, apparently, that some practitioners have thought it best to continue the use of alcohol, while the patient is still raving and trembling from its effects. I do not understand them to suppose that they are acting on any homopathic principle: they aim only at fending off the danger of the excessive crisis by restoring that condition of alcoholic saturation the patient enjoyed previously, and during which he did *not* fall into delirium tremens. I cannot agree with those practitioners. Truly enough the raving, and the terror, and the trembling, and the sweating, and the awful chaos of dreaming and wakefulness, in which the poor wretch is plunged, are made somewhat more tolerable by the dose—the pains are palliated. Nevertheless, there is a higher aim of treatment than palliation of pain; the danger to life does not depend on these symptoms, but on the suspension of the controlling functions of the brain; and to that suspension and danger each additional drop of alcohol must contribute its share. I feel sure that life is risked by the alcoholic treatment of delirium tremens; and the risk of life is, in this disease especially, the paramount consideration. For the patient has brought it on himself by his own fault, and so long as he does not die I am very little anxious to spare him the pains and penalties of his

self-indulgence, which pains and penalties may perhaps contribute useful lessons of future conduct.

My own plan of treatment has been to cut off the supply of alcohol—at once, and, so far as my power extends, for ever. Where there is no vomiting, I give a mustard emetic, and then a purgative enema. If the patient is quiet enough, the vital temperature, which, as we have seen (p. 225), is lowered by alcohol, should be kept up by a warm bath, or at least by hot ablutions. And fresh material for new tissue, with assistance in getting rid of effete tissue, should be assiduously furnished in the shape of meat and water united, as beef-tea with the pounded beef in it. A sift of pepsine mixed with grated Parmesan cheese will make it spicy for the jaded stomach, and promote its digestion. The addition is especially desirable if in consequence of vomiting the food has to be taken by enema. (See recipe for the enema, p. 269.)

It will be seen that the intention of the above-mentioned treatment is to evacuate the alcohol, and to counteract its suspensory influence on the vital warmth and on the assimilation and renewal of the nervous tissue.

There is one other highly important measure which is rendered needful by the reduced power of the nervous system during its functional arrest. The functions that depend upon it must be spared work. Complete quiet, and shielding from whatever can excite the mind, is important, not only during the disease but during convalescence, lest a relapse should occur. The excitement may be so mild as scarcely to occur to us as a risk; yet by the frail machinery and unfed tissues it cannot be borne. I will quote an example from my note-book. An earnest young curate who came under my care for delirium tremens, contracted by drinking bad brandy to support him in his daily ministration to a large country parish, had got so well again that I consented to his breaking the intolerable idleness of a Sunday in London, by hearing a famous preacher. During the night (to my shame) he had a relapse, and acknowledged that the cause was the contagious

enthusiasm of the orator. Again, in a former chapter (page 234) is mentioned a case strongly impressed on my memory by being the only young female patient I have lost by delirium tremens, and in which the disease was due to the mental excitement caused by a false accusation of theft after dram-drinking of by no means an excessive character. This weakness of the nerve tissue which gives way under such moderate pressure as it could easily resist in health, is explained by the arrest of its vitality indicated by the non-excretion of phosphates during the after-effects of alcoholic anæsthesia, as before described. We must not forget to allow for it in the treatment of patients.

It is rather beyond the scope of the subject in hand to speak of the influence of other anæsthetics in disease; yet I cannot pass on without saying that if an ordinary dose of opium or its alkaloids, or of hydrate of chloral, gives a patient a few hours' sleep, he seems to me none the worse for it. But it is most dangerous to look upon them as specific, and to administer them in continuous reprises till sleep follows, or in the enormous doses that have been employed by some practitioners. The reason for those enormous doses being tolerated is that absorption has been arrested, and that they have passed away harmlessly. But supposing that absorption should be suddenly restored, the enormous dose can hardly fail to cause sudden death. No advantage is gained, and a great risk is incurred.[1]

[1] It is surprising to find such a generally judicious physician (Dr. Todd) an advocate of the homopathic treatment of alcoholic poisoning. In the last of his *Clinical Lectures on certain Acute Diseases* (one on the therapeutical effects of alcohol) he commends the free administration of wine to a child of three years old, who was dying from convulsions and hemiplegia in consequence of having swallowed a large quantity of gin, and regrets that brandy had not also been poured in by the rectum. He relates also specimens of delirium tremens similarly managed, but their result cannot be said to justify the use of brandy except to a most bigoted adherent. He himself does not propose to act in the same way in respect of other articles of the materia medica.

In *chronic alcoholism* I allow the same argument to hold good. I have never found harm to arise from leaving off alcohol altogether and at once. I am not prepared to deny that delirium tremens may have been the result, in some cases, of such precipitation, but it has not happened in my experience; and I should be ready, if it did happen, to treat it in the usual way, confident that the patient, in spite of the accident, was still gaining a positive advantage by abstinence.

§ 3. Ague and Intermittents.

In ague, alcohol should not be spared as an article of diet; and taken more freely than usual it contributes to lengthening the interval and shortening the paroxysms, converting quotidian into tertian, and curing tertian altogether. And, in brow-ague, neuralgia, inconstant sciatica, and other intermittent diseases of similar nature, it is sometimes equally efficacious. But, given during the paroxysms, I have not found so much benefit—perhaps it is not absorbed.

In ague the combination in which alcohol is offered is of considerable importance. The most generous red wines should be used, and the distance at which their bouquet may be smelt may be taken as a rough test of their utility. I remember learning a lesson on this point from a most unscientific source. I was chatting in the market-place at Dijon with a farmer's wife, when she incidentally mentioned that her husband was a great sufferer from ague, and was quite tired of swallowing quinine. I advised her to take home a good supply of Burgundy in her market-basket, and begged to contribute the few francs I had in my pocket. She tripped straight off to a grand wine-merchant's office; but instead of coming out fully laden, she bore only two bottles, to the price of which she had contributed out of her own purse. It was of a vintage such as is allowed to trickle slowly over the tongue at the table of a prince, and I promptly called her a prodigal. 'No, no,' said she, 'I am not; a mouthful of this

is worth to a sick man a bucket of commoner wine '—and yet the common wine of Dijon is not to be sneered at. She was quite right; there is no wine like Burgundy for ague, and the price (provided the merchant be honest) is a direct measure of its medicinal value.

§ 4. Other Diseases of the Nervous System.

Alcohol has been used with great advantage in *Sunstroke*. Dr. Maclean (in his article on the subject in Reynolds' 'System of Medicine') strongly commends the employment of *Warburg's Tincture*, the only known ingredient in which is alcohol, and in addition a judicious quantity of dietetic stimulants. The treatment advocated by this gentleman does not seem to have yet taken hold of the Anglo-Indian medical mind, for the author speaks of venesection still being employed on a large and fatal scale quite recently; so that numerical evidence of success cannot be furnished. I should expect it when collected to be decisive; for there are reported in sunstroke several most important symptoms which connect its pathology with that of other morbid states benefited by alcohol, viz., a copious excretion of solids in the urine, a high temperature of blood, delirium, weakness of the sphincters, trembling of the muscles, and death by syncope or coma.

I have never had a case of genuine sunstroke under my care, the best imitation of one which this cloud-kerchiefed climate has afforded me having been caused by long sitting at a desk with a bald head close to an Argand gas-burner. But if ever I were to practise in a hot climate, I should unhesitatingly adopt Dr. Maclean's treatment, both as to the use of ice and of alcohol.

In *concussion of the brain* from accident, stimulants are usually administered before the arrival of a surgeon, and no injurious consequences appear to follow. And blows on the head which happen to revellers produce, as a rule, much less cerebral lesion afterwards than is expected from their violence.

The hint should not be lost, especially since some of the symptoms of severe jar to the brain-tissue much resemble those recorded as produced by sunstroke; indeed, so closely as to have suggested the insertion of this paragraph in its present place.

Neuralgia is often decidedly benefited by alcohol, as has been already said. Taken dietetically at meals, it involves no risk of tempting the patient to intemperate indulgence; and if good generous wine be the vehicle, a very moderate quantity often suffices. Spirits are not nearly so effectual, and require to be employed in larger doses.

But this is not all that the sufferer asks; he wants to know if he may not have recourse to the remedy when his agonies are upon him; for neuralgia is not like ague, and is relieved in an unmistakable manner by alcohol during the paroxysm. It is hard to refuse, and, unless the patient surpasses the average in folly, I do not refuse. But at the same time I give this caution—that the intended dose should be fixed upon, and not exceeded even if the pain remain as severe as ever. The chief benefit is by no means immediate, but consists principally in shortening the paroxysm. An intimate friend of mine with an 'irritable stump,' often brought on (like Nelson's) by cold or mental annoyance, on the invasion of the spasmodic movements takes a tumbler of very hot spiced port (bishop) or of stiff whisky toddy, and then waits patiently till the trouble ceases. This it usually does in two or three, instead of lasting twenty-four, hours. But whatever happens, he strongly advises that the stimulant should not be repeated.

Hypochondriasis is too generally a constitutional and hereditary complaint to be a good test of the virtue of any remedy. The few hypochondriacs in whom I have witnessed any improvement have been persons who had been living a dull abstemious life, and have been persuaded on sanatory grounds to indulge the palate and the fancy from time to time with unwonted liberality. It is very possible that Sanctorius'

monthly excess might be a sanatory measure here, though one is loth to give advice which is capable of misinterpretation. But the daily and habitual use of alcohol in hypochondriasis is worse than useless—in fact, deleterious. I have known several cases receive much benefit from entirely leaving it off.

There is a peculiar form of *hypochondriasis* which arises from eating too little vegetables and too much meat. It is distinguished by the high specific gravity of the urine (1·025 to 1·035) dependent on the presence of urea alone without sugar. There is in these cases often a remarkable lassitude and apparent paralysis of the limbs suddenly occurring after exertion. Sometimes there is emaciation. Both these symptoms usually lead the patient and his friends to attribute the morbid state to insufficient nutrition, and to increase more and more the proportion of meat in spite of the aggravation of the ailment. A rapid cure attends the diminution of the meat meals to one daily, and the supplying their place with plenty of porridge and green vegetables.

In *mania*, *melancholia*, and *dementia*, the most recent experience seems unanimous in recommending alcohol. Dr Maudsley makes no distinction between them in speaking of the therapeutics of insanity, and indeed seems to proportion the strength of the liquor to the violence of the disease. He speaks of 'wine' as a prophylactic against madness in general, and 'brandy' as a remedy in maniacal excitement. I cannot find, as I should have liked, any warning bearing on cases which can be traced to drunkenness in the individual affected, though it can hardly be doubted that such do exist, and require special management. Even if the sequence of causation have been reversed, and the intemperance be the consequence of the madness, the association of the two must surely modify the treatment. It may be that Dr. Maudsley approves of the homopathic therapeusis of alcoholism, and his evidence to its prudence would be very valuable; but it should be distinctly and boldly expressed.

Leaving this branch of the question open, it may be freely

granted that his sketch of the current practice in curable disorders of the intellect is correct, and his confidence in its success is not misplaced. But here, as in health, I would limit the quantity, as a rule, to that which suits the stomach best and increases the appetite.

The advantage of an ample and nutritious diet in insanity is daily more and more forcing itself upon the proprietors of lunatic asylums, though their interest of course would tempt them to an opposite creed. It is good economy in the end to feed highly even pauper lunatics, unused as they may have been to such treatment; for by such means cures are effected, and the country relieved of the charge.

CHAPTER VIII.

SCROFULA, RICKETS, AND CONSUMPTION.

Section I.

Scrofula is indubitably an hereditary disease; and some observations incline me to the suspicion that the development of the ancestral stain is more common when it is on the maternal side than when it is derived from the father. A faulty early nutrition would seem to have as much influence in drawing it out, as the source of the vital spark. For this reason a mother who is conscious of the existence of scrofula in her family, even should she never have been herself afflicted, should deny herself the privilege of suckling her infants; and a healthy irreproachable wetnurse should be got to supply her place. On the other hand, when it is from the father's side that danger is feared, it is peculiarly incumbent on her to play her important part with assiduity, and to protract the time of lactation to its full period, observing accurately the suggestion made in the first chapter of the Second Part of this volume. I cannot too strongly urge the duty of impressing this upon patients.

The nursing mother will act wisely also if she takes after her meals small doses of the Syrup of the Phosphates, or Parrish's Chemical Food.

Lactation ended, the child's diet should be arranged so as to contain a rather larger proportion of animal food than recommended for ordinary nurseries, and the instinct for a carnivorous nutriment should be encouraged, or at least not

thwarted. Warm clothing, much sunlight, frequent exercise in the open air, and an annual breath of sea air will powerfully aid in keeping off the dreaded disease.

The 'weariness to the flesh' induced by overmuch study must be sedulously prevented. It spoils the appetite and digestion, so essential to the object of our care.

The cold plunge-bath, well-ventilated rooms, moderation in the pursuits of pleasure and ambition, and a virtuous life, will usually carry our patients safely up to manhood and womanhood, and after that they may be considered safe.

Supposing the tendency is so strong that in spite of these precautions the disease appears, I do then think drugs are useful, but chiefly those which have the nearest relation to aliments, such as iron, the phosphates, cod-liver oil. Their effect on the appetite must be carefully watched; and the end must not be sacrificed to the means—if they spoil the appetite they must be left off immediately.

In this case also, I think alcohol is of service, employed with the same watchfulness as articles of the pharmacopœia.

Section II.

Rickets (*Rachitis*) is distinguished from scrofula by being very rarely, if ever, hereditary. It consists in a softening of the bones, especially of the back bones, in children who do not absorb enough bone-building materials in their food. I think I cannot do better here than quote the words of Dr. Trousseau, who, with his usual happiness of expression, has put before the world the striking results of M. Jules Guérin's researches:—

'Of all causes, that most sure to produce rickets is improper food.

'In his first works M. Jules Guérin had adopted the idea generally admitted that rickets and scrofula are occasioned through deficient feeding; and by that term, according to vulgar prejudice, was meant suckling carried on too long.

But his observation taught him soon that the direct converse of this proposition was true, and that the babies who became rickety were not those who had been kept too long at the breast, but those on the contrary who had been prematurely weaned. In fact, it appeared to be true enough that under the influence of an insufficient supply of proper food, the malady developed itself; but by proper food was to be understood something different from what was commonly meant. Experiments tried upon animals made the question quite clear. In these experiments M. Jules Guérin set himself to find out if it were feasible to produce rachitis at will. He took a number of puppies in equal condition; and having let them suckle for a time, he weaned suddenly half the lot and fed them on raw meat, a diet which at first sight would seem the most suitable for carnivorous animals. Nevertheless, after a short time, those who continued to take the mother's milk had grown strong and hearty, while those who had been weaned on an apparently more substantial diet pined, and were taken with vomiting; then their limbs bent, and at the end of four or five months the poor little beasts showed all the symptoms of confirmed rickets. From these experiments we must conclude with M. Jules Guérin that the rachitis depended in great measure on the derangements of nutrition which claimed improper diet as their cause. A diet which is taken to at a wrong season may fairly be called improper. For carnivora, it is flesh before the age of suckling has passed; for herbivora (and an experiment bearing on the point has been made on pigs) it is vegetable feeding, given them too soon, when they ought to be still at the teat. In the human race the same thing happens. Rickets is never so common as it is in babies weaned ere the teething is forward enough, and brought up on pap, vegetables, or even meat.'[1] It would be waste of time to point the moral of these valuable sentences.

The daily addition to the dietary of a small quantity of the phosphatic salts is still more indicated here than in scrofula.

[1] Trousseau, *Clinique Médicale*, vol. iii. p. 484, 3me éd.

But still nothing can take the place of milk, an article of diet in which our labouring population, both in town and country, is sadly deficient. I have no fault to find with coal clubs and clothing clubs, but I am sure that as a preserver of infantile health a 'cow club' is worth them all. Even the small weekly contribution, so difficult to extract from our reckless race, can be dispensed with, by arranging the price paid on delivery, so as to cover keep, insurance, contract for medical attendance, and replacement of superannuated animals. Charitable help is most valuable when it takes upon itself the duty of advice and superintendence. But still, O Lady Bountiful, do not give your spare and skim milk to the store pig, when there are half a dozen children growing up bow-legged and crooked within half a mile of your lodge gate for lack of it. Do not *give* it at all, but bestow the much greater boon of selling it—as low as you like, but still sell it.

Section III.

Consumption.—Since the introduction into our materia medica of Cod-liver oil by Dr. Bardsley of Manchester, the profession has been growing gradually, but surely, convinced of the all-importance of the dietetic treatment of pulmonary consumption. Cod-liver oil is a typical aliment, representing what is the fittest of all known substances to supply the deficiency that constitutes the disease. To use the language of microscopic physiology, 'the basis of molecular growth' is poisoned, so that instead of actively secreting gland, or elastic tissue, or blood-vessel, or epithelium, &c., fit for their various duties, being formed, only a useless cheesy substance is the product of nutrition. The due powers of life are lacking in it. We call it 'tubercle,' and look upon it, if we are thoughtful people, as an infant tissue strangled in its cradle. To save then the parts threatened with tubercle, we must anticipate the formation of the imperfect matter by supplying a groundwork for perfect tissue. This groundwork is laid by freshly

assimilated oleaginous substance; oleaginous substance is what is furnished by nature for the primary growth and nutrition of all the higher tissue of animal bodies; and indeed many physiologists assert that without it there is no growth; so that in administering it, we are closely imitating the wisest teacher of medicine, mother Nature.

The reason, then, for giving cod-liver oil is to counteract the tendency to form morbid solids by supplying the most suitable material for healthy solids—in short, by overcoming evil with good. This is a much higher aim than the mere replacement of the plumpness of flesh whose waste gives the name to the disorder. The object is not so much to cure emaciation, as to cure the cause of the emaciation. Very necessary it is to understand this; for not a few tuberculous and many tuberculously inclined patients are well furnished with fat, and some are even corpulent; and they will demur to the prescription of our remedy, if they are allowed to retain the dominant idea that all it can do is to fatten. Young women, especially, of consumptive families will often object to the risk of losing the elegant slimness of youth, and insist that they are as plump and round as they ought to be. What they say may very likely be true; but yet their store of fat can only keep up the temperature of the body, and cannot be used again for nutrition. For the purpose of nutrition, recently assimilated fat is requisite; and thus tuberculosis may go on unchecked for lack of it, even in a corpulent person, since his store of fat is not available for digestive purposes.

At present cod-liver oil is the most readily assimilated fat we know of: and so to it all other means of treating this class of diseases have a reference. Some substances ground their claims for notice on being substitutes for it, and drugs of various kinds act beneficially by preparing the stomach to digest it; but anything which does not look to it for a character is of only accidental utility.

I heartily wish that some of the efficient substitutes for fish-oil were more agreeable to the palate; for it must be

confessed that the taste and smell are a serious impediment to its employment. Suet is apparently the best: in milk it is to some persons not repugnant, and its digestibility is increased by its being made into an emulsion with one of the gastric solvents, to be obtained in the shops under the name of 'Pancreatic emulsion.'[1] Milk, by itself, comes next in value, and a milk diet has from the earliest times been recommended in advanced phthisis. But the large quantity required to be swallowed, often deranges the stomach and produces repugnance; so that in recommending it to a patient it is necessary to warn him of this difficulty, and take example by our master Hippocrates, who, in advising a consumptive to drink a large quart jug (*τρικότυλον κύλικα*[2]) of mare's milk the first thing every morning, adds significantly 'if he can.'

Devonshire cream has been used as a substitute, but I cannot say it has proved in my hands an efficient one. If taken in sufficiently large quantities to be of service, it is apt to exercise a purgative action.

For my part, I think it is wisest to try and get habituated to the fish-oil, adopting some of the various little devices which are used to diminish its nauseousness. In the first place it is essential that the article should be the best of its sort, that is, as free from smell, taste, and colour as possible, showing its careful and recent preparation. Though they do not always tell their customers, the importance of this freshness is well known to manufacturers. I learnt so when prescribing it for a stranger a few years ago: her husband, who was present, stopped me when I was describing what cod-liver oil should be, saying he knew all about that, for he made it, and engaged that she should have it fresh prepared daily.

Some patients will take the oil easiest in milk. Some find the taste annulled by eating a piece of red herring, or anchovy, or sardine, before and after the dose. Some like the bitter aromatic of coffee to counteract the rankness; and this fancy

[1] The credit of introducing this to the profession is due to Dr. Dobell.

[2] Equal to two pints and a quarter.

I am glad always to hear of; for it gives an opportunity for recommending a bitter drug which assists powerfully in the assimilation of the oil. If coffee is approved of, I then advise the oil to be taken as a parenthesis in a mixture of quinine, or of strychnine, or of both together. A sip of the medicine is to be taken, then the oil swallowed, and washed down with the remainder of the draught. If there is persistent nausea afterwards, a few drops of hydrocyanic acid may be added each time. Nausea may also be avoided by taking the oil on going to bed. Where there is cough, the sheets should be previously warmed.

But the taking of cod-liver oil is not an exemption from all other care. The student of the literature of the subject will find his faith claimed by two extreme parties, one of which is all for beefsteaks, porter, and in short for as carnivorous a diet as possible, the other in favour of pulse and herbs, seeds and potatoes. Both are as far right and as far wrong as it is probably possible to be. They are quite right in what they include, and quite wrong in what they exclude. The food should be as near that of health as the digestion of the patient will allow, that is to say, mixed and varied, liberal in frequency, and moderate in quantity. The whims of appetite should not be thwarted, nor the prejudices of theory indulged: the demands of muscular exertion should be provided for by the starchy ingredients of the dietary, and the increased wear and tear of the machinery by the nitrogenous.

The full powers of digestion should be brought into activity by plenty of open air and exercise within the bounds of weariness. And this is the reason why English patients are advised to live during the winter months in more genial climes than their own. They get thus more sunlight and oxygen without damp. But also the change is good; for it has been found that to those living in parts of Britain where the atmosphere is soft and mild, as in the West, a colder and more bracing air, provided it be dry, is sometimes beneficial. From Cornwall the small trading vessels will sometimes

carry a consumptive miner to pass the winter in Greenland; and patients have been sent with advantage from such localities as Leghorn to the exhilarating sharpness of a snow-clad Alpine upland. But this plan requires great caution.

Much more confidently can the recommendation be given that the advantages of a sea-life should be favourably put before the youths of families, where there is an ancestral tendency to pulmonary tubercle. I do not mean that they should be driven into it against their will, but that it should be made as attractive as possible. The healthy state of a young sailor's digestive organs is the best guarantee that can be obtained against consumption.

As to the use of alcohol in threatened cases, and in the early stages of tubercle, I have no hesitation in pronouncing an opinion adverse to it. But if the morbid matter has broken down, and there is either nocturnal perspiration, copious purulent expectoration, diarrhœa, extreme emaciation, or depression of spirits, wine, especially port wine, in quantity equal to the occasion, is often of decided use. When the demand for it has passed away, it may be left off.

CHAPTER IX.

DISEASE OF THE HEART AND ARTERIES.

Section I.

In disease of the heart the most remarkable change in respect of digestion is the slowness with which liquids are absorbed by the stomach. If much is drunk at once, it will remain a long time gurgling about, and, instead of assisting digestion, will offer an impediment and cause inconvenience. The reason of this is the slackening of the circulation of the blood, which is directly or indirectly effected by all the various cardiac lesions in common. Whether the heart is too thick or too thin, too large or too small, whether the openings of valves are obstructed by warty growth, or whether their stretched curtains fail to control the flux and reflux of the current, the practical result is one, namely, that the vital stream is unnaturally sluggish. Now it is a well-known law governing the passage of liquids through membranes that it is promoted by the rapid movement, and retarded by the sluggish movement, of the fluid towards which the endosmosis is tending. It is clear, therefore, that the absorption of potables from the digestive canal into the blood must be deficient in close proportion to the obstruction presented by the defective machinery of the circulation.

The observation of a dry diet contributes greatly to the comfort of the patients now being considered. The dinner should never be prefaced by soup, and the drink should be taken only in sips during the meal. And what is taken should

not be cold, but at least have the chill taken off. When thirst occurs between meals, the same rule of sipping should be observed. In this way quite a sufficiency to supply the requirements of the kidneys may be introduced—indeed, more is probably got into the blood than when larger quantities are gulped down at once, chilling and paralysing the absorbent powers of the mucous membranes.

Independent of the inconvenience which the indigestion of fluids causes, it may be feared also that the distension of the stomach accompanying it interferes with the already laborious action of the heart, and aggravates the organic source of the malady. This is especially the case in Dilatation with Thinning of the heart's walls, and is least noticeable in Valvular Disease.

Where Heart-disease is complicated with obesity, especially if the fat is accumulated in the chest, the enforcement of a dry diet is still further to be viewed as imperative; inasmuch as it contributes powerfully to the reduction of the hypertrophied adipose tissue.

The only symptom which may perhaps render it a doubtful policy is the occurrence of dropsy. Should this be very decided, it is of importance to keep the kidneys active to a degree that can be accomplished only by the ingestion of a considerable supply of watery drink. I think, however, this should be always followed up by purgative medicines, often even by mercurials. And when the necessity has ceased, the dry regimen should be resumed.

The dietary of persons with imperfect hearts should be at least as nitrogenous as if they were completely sound. What we have to dread is the atrophic degeneration of the cardiac muscle, for till this degeneration occurs the original lesion is not aggravated; and the constitution often gets so used to the state of mechanism of the heart that no inconvenience of any kind is felt. And atrophic degeneration is warded off by keeping up the redness and fluidity of the arterial blood.

The importance of the existence or non-existence of valvular

disease lies not in the injury it directly inflicts, as in the likelihood of the induction of other lesions of the heart. If the muscular structure remains healthy, injured valves do not appear capable of causing death. But very surely are they fatal when they are followed by dilatation or thickening or degeneration of the cardiac walls, with the sad train of dropsies, apoplexy, pulmonary hæmorrhage, &c.

In 2161 post-mortem examinations at St. George's Hospital in ten years, the cardiac valves were diseased without the walls of the heart being affected 113 times; but in every case there were other lesions amply sufficient to account for death quite independent of the valves, such as accidents, surgical complaints, cancer, low fever, &c. In one alone, where anasarca from granular kidneys was the immediate cause of death, could any symptom be debited to diseased valves with healthy heart, and that symptom was pulmonary hæmorrhage.[1]

In the classes of people represented by hospital patients, the probability that valvular disease will be followed by its unhappy consequences is very great. When a patient thus affected leaves our hospital wards, we expect to see him again shortly, and on each fresh admission with a more severe complaint. But the same expectation must not be applied to the more comfortable classes of society. Persons in easy circumstances have valvular lesions for years and years, perhaps through the greater part of a long life, and not only continue to live, but even fail to experience symptoms bad enough to consult a medical practitioner.

In my volume of Clinical Lectures[2] I gave some two dozen examples of persons found, when examined for insurance, to have valvular lesions, but who, during periods varying from 50 years downwards, had not in anywise suffered in consequence. This I attribute to their not being dependent for

[1] *Decennium Pathologicum*, MS. in library of Medico-Chirurgical Society, chap. x. sect. i.

[2] Lect. xxv.

daily bread on daily labour—in fact, to ease of mind and body.

The renewal of the destroyed tissue being impossible, and equally so any mechanical compensation for the arrested function, it is obvious that in the treatment of the disorganised valves themselves, restorative medicine, in the strictest sense, must be quite at fault. But indirectly it is almost as effective in prolonging life, as if it could put in a new valve, or make another muscle do duty for the resting ventricle. It may repair those reparable conditions which are injurious, and which by bringing on enlargement constitute the real danger in cardiac cases. Let us try and cure what is curable, and trouble ourselves as little as possible about bygone injuries.

While we bid our patients live generously, we must disabuse them of the notion that the advice includes a free allowance of alcohol. Alcohol is really the most ungenerous diet possible. Addiction to it impoverishes the blood, and is the surest road to that degeneration of the muscular fibres which is so much to be feared. And in diseases of the heart it is especially hurtful, by quickening the beat, causing capillary congestion and irregular circulation, and mechanically dilating the cavities. Let the fermented drink be limited to that quantity which increases the appetite. In a great many instances this may be very shortly described as none at all, but often also, whether from the force of habit, or the nature of the constitution, a sip of wine enables a sufficient dinner to be eaten, and more fully digested than when not thus assisted. Burgundy and Champagne are the best adapted for the purpose, as a small quantity of these wines is inspiriting, with a minimum of alcoholic contents.

Section II.

In the treatment of *Aneurism* the science of diet plays a part different from that which it plays in any other diseases which

we have been reviewing. In them it aims at restoring health by replacing what is deficient, and bringing the body directly into a state as near the full natural state as possible. Here its intention more resembles that of a drug; it would bring the blood temporarily into a morbid condition, to accomplish a certain definite object; it makes a sacrifice to realise a future advantage.

By *Aneurism* I mean the formation of a pouch in an artery through the yielding of the sides of the tube. The danger is lest they should go on yielding, burst, and let out the life-blood. Therefore, if the artery be a small one, and capable of being spared till it is replaced by a collateral circulation, mechanical surgery can save life by tying, compressing, obliterating it, or by removing the limb where it is situated. In the largest arteries such trenchant treatment is obviously impossible; yet there are found from time to time instances of aneurism in even the largest arteries being rendered innocuous by a natural process. In patients who have died of other diseases, the pouch has been found plugged up, and leakage prevented by a firm caulk of fibrin, clotted out gradually from the blood. It is usually adherent to the roughened or torn sides of the artery.

Why is not this happy cure always found? In a great many cases because the mouth of the pouch is so wide and open that the blood cannot stagnate long enough to form a clot. But in others also, because the fluid is so rich in non-coagulating material (to wit, blood-discs) that it coagulates with difficulty, and under some circumstances not at all.

In such a case—that is to say in a person whose fresh colour, muscular development, and good digestion show him to be healthy-blooded—if an aneurism forms, the best chances of restoration to safety are to be sought in making the circulating liquid—first, unnaturally stagnant, and secondly, unnaturally coagulable.

These objects can be attained by keeping the patient in bed and starving him. Thus is produced an artificial

anæmia, a state of blood in which the red discs are deficient, and the fibrin is in excess, a state in which coagulation is at its maximum, and the force of the heart at its minimum. The method is commonly known as Valsalva's, and it has met with a sufficient measure of success to warrant a trial of it being made in every case where no impediments lie in the way. About fifteen years ago, I published a clinical lecture on several patients treated thus, and I concluded that 'not merely is it the best mode, but the only honest mode, of treating aneurisms of the trunk vessels; because it is the only one we at present know consonant to reason and experience.'[1]

The most successful cases are those where the sac is in the descending and abdominal aorta, as that of the stone-mason I mentioned in the lectures just quoted. Yet others are not to be despaired of. In the 'British Medical Journal' (December 16, 1865) is published a case by Dr. Waters of Liverpool, of thoracic aneurism successfully treated by rest and low diet, and Mr. Tufnell of Dublin has advocated its use in those cases of aneurism which would come under the care of a surgeon.

Bread and water, or pudding and water as advised by Valsalva, and used as punishment diet at prisons, is the most effective. Valsalva gave as little as half a pound of pudding in the morning, and half a pound in the evening, till the pulsation of the tumour was arrested, and then he gradually increased the quantity till ordinary diet was resumed, carefully watching against a relapse, however, during this latter process. And I agree that it is better at once to try the experiment with extreme rigour, and give it up if necessity will have it so, than to shiver and vacillate on the brink of the serious struggle for life, perhaps too late to be of use.

The confinement to bed must be absolute.

To the future conduct of those who have suffered from aneurism, and in whom a recurrence of the disease is, of course,

[1] *Lectures Chiefly Clinical*, lect. xxiv.

to be feared, it is obvious that the principles above advocated do not apply. The formation of an aneurismal sac is a degenerative process; and starvation, bleeding, and confinement to bed would be most deleterious, as tending to induce further debility and degeneration. The anæmic dietary is for the sole purpose of bringing about the formation of a clot, and the prevention of further degeneration of the arteries must follow an opposite path. Iron, nutritious food, good dry air, moderate exercise, and suitable clothing should be perseveringly adhered to for the rest of the patient's life.

I would strongly advocate, also, in the interests of the digestive organs, a change from the climate of England, where degenerative disease is the rule, and acute disease the exception, to Italy, where degenerative disease is the exception and acute disease the rule—a change, if not for life, at all events for long enough to alter the constitution. It may be remarked that it is in the absence of aneurism that this peculiarity of the Italian climate is shown. In the statistics of Milan Hospital (*Rendiconto della Benificenza dell' Ospetale Maggiore, &c.*, 1862), I find but 4 instances of thoracic aneurism in 61,761 patients, or 1 in 15,440; whereas at St. Mary's Hospital, London, I find 29 in 7,319 patients, or 1 in 252. Again, at Genoa I find the last published bills of mortality (for 1860, printed by Dr. Giovanni du Jardin) without any deaths by aneurism. The corresponding report for London contains 103. The differences are so great, that the limited range of the observation is unimportant, and I cannot but conclude that there is something in the climatic influences of London favourable to, and something in Milan and Genoa antagonistic to, the formation of aneurism.

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