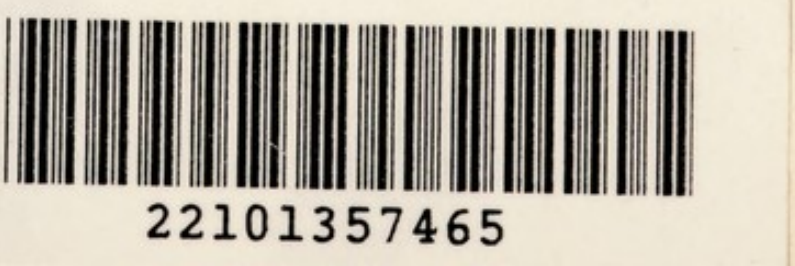
The science and art of living / by Leonard Williams.



The Science and Art of Living

THE SCIENCE AND ART OF LIVING

BY

LEONARD WILLIAMS
M.D.

HODDER AND STOUGHTON
LIMITED LONDON

[1924]

Made and Printed in Great Britain. Butler & Tanner Ltd., *Frome and London*

DEDICATED

ON BEHALF OF "THE BRUTE"

TO

HER WHO FEEDS HIM

Preface

THIS book is frankly didactic and propagandist. The essence of successful teaching is repetition; of successful propaganda, constant repetition. I therefore make no excuse for such repetitions, duplications and redundancies as might, in the absence of some explanation, reasonably be urged against the scheme adopted. Further, I may be charged with overstating the case for a simpler life, which is the keynote of what I have written; to which, were I to plead guilty, I should urge in extenuation that overstatement is one of the recognised tricks of the propagandist trade, whose professors assure me that exaggeration and repetition are equally necessary to salvation. But I do not plead guilty: I am, on the contrary, fully convinced that the principles enunciated in the following pages are scientifically accurate, and that their translation into practice would be followed by an enormous improvement in

the health, efficiency, and longevity of the community. To those who might complain that perseverance in physiological sinlessness is dull, I would retort that perseverance in physiological sinfulness is much duller. In the former case there is always the pleasant prospect of a possible burst into pravity, whereas there is nothing so jejune and vapid as a retreat from sustained surfeit back into the rigours of righteousness.

It is said of some of the Roman Emperors that they became so puffed up with pride by the enormous extent of their power, as to believe themselves demigods, an attitude of mind which the wise among them sought to correct by causing slaves to follow the imperial car repeating the words "Memento te hominem esse." It would be a good thing if the cars of to-day, aye, and the omnibuses and railway carriages—and not only the first-class among them—were to display the legend "Memento te animal esse" in large letters and conspicuous places. The belief that in addition to certain god-like attributes of mind, with which he is certainly endowed, modern man can successfully claim anything transcendental in his body; or,

to put it in another way, the denial, tacit though it be, of man's solidarity with the lower animals, has produced and stereotyped in him the attitude of mind which the wiser of the Roman Emperors rightly dreaded. It has been my object in this book to emphasise what Darwin called "the indelible stamp of man's lowly origin," and to show that good health can be obtained and maintained only in so far as human life is lived in consonance with the physiological laws, to whose governance ultimate submission is inevitable.

The crime of this civilisation is gluttony, begotten of an arrogant assumption of superiority. If modern man were to apply to any of his domestic animals the dietetic principles to which he himself clings with such disastrous determination, he would not be long in realising the appalling results of his stupidity. However firmly the moving finger may trace words of wisdom and warning on the wall, he comforts himself that they do not apply to him, but merely to the animals, and refuses in consequence to modify his gluttonous habits.

Politicians are in the habit of talking about a higher standard of living. There

can never be a higher standard of living in the true sense of that word until man learns to recognise that the only cure for the present physical discontents is the practical admission of his physiological solidarity with the vertebrate animals, and a willing submission to the laws which govern their living. The quest of health and efficiency is a stimulating adventure, well worth the sacrifice of the petty luxuries which we have ignorantly and arrogantly embraced. In no relation of life is it more true than in the domain of health that

> "Men at some time are masters of their fates:
> The fault, dear Brutus, is not in our stars,
> But in ourselves, that we are underlings."

In the matter of health most men, at most times, are masters of their fates, because Nature not only wants them to be well, but is anxious to help them to get well. But she is seldom given a chance. Present-day man has unfortunately inherited a hoard of hoary shibboleths into the value of which he takes no trouble to enquire. If he were to do so, he would quickly realise that they were invented by the devil to bring premature death into the world and all the woes

of avoidable ill-health. To master the ignoble fate which now awaits him, man must rise from his intellectual lethargy in matters scientific, and justify the education to which he is heir, by revising his standards and uplifting his ideals. In the following pages I have, crudely enough, sought to indicate the lines upon which such an endeavour may profitably be pursued. I have tried to lay the foundation: the superstructure is for each individual to erect, according to his lights, his ambitions, and his strength of purpose.

Contents

Part I The Science

Biological

It is a trite saying that civilisation is only skin-deep; but in matters of health it would be well if its truth were more often realised. We have become so accustomed to the superficial varnish which differentiates us from the barbarian that we are liable to lose sight of the barbarian which is essentially and fundamentally within us. In the beginning we were animals, and it is as animals, with animal instincts and animal intuitions, that we have evolved into what we now are. Pride in this acquired *panache* is liable to give us swelled heads, and it pleases us to think of ourselves as being all head and no trunk. We have come to substitute for intuition what we are pleased to call reason, forgetful or unmindful of the fact that reason, to be operative, must be based upon complete knowledge, and that our knowledge in matters physiological is deplorably incomplete. The religious movement of the eighties, away from

authority towards agnosticism, had its counterpart in science; but the theologians were wise enough to recognise that they did not know (a-gnosco), whereas the scientists were arrogant enough to think they did. The pendulum is now in full swing, and those who concern themselves with physiology and the health of man have come to recognise that it is useless to study man as he now shows himself; they must study, not the gentleman or the bourgeois, but the genus homo. Human ologies rest upon biology; in all living things, even in plants, there lies veiled the solution of many problems the full elucidation of which are essential to complete knowledge. The great Victorians, Darwin and Huxley, may be said to have invented biology. They were pure scientists, of a stature so colossal that distance and time were necessary to do them justice. Knowledge came through them, but the wisdom of its practical application has lingered sadly. They showed us man's kinship with the rest of creation, and warned us that there was nothing transcendental about the genus homo. By implication, they impressed upon us that man was essentially an animal, and was subject to the laws

which govern the animal kingdom; and that if he defied these laws, as he was in the habit of doing, he was compassing his own undoing. Darwin died in 1882, and Huxley in 1895, but it was not until very much later that people began to put their teachings into practice. The idea, for example, that fresh air, especially cold air and night air, was a deadly poison to the human race has not yet entirely passed away. Even the successful treatment of consumption by open-air methods has failed wholly to convince even intelligent people that it is warm and stagnant air, not the cold and circulating, which really holds the germs of deadly disease. The French, with all their logic and imagination, while paying a willing lip service to fresh air precepts, continue to sacrifice themselves on the altar of an avoidance of draughts. Veracity of thought and intellectual honesty ought long ago to have compelled the conclusion that fresh air, even when it entails disagreeable draughts, is just as essential to the genus homo, as it admittedly is to the horse or the cow or the bird. Nearly all the larger animals in captivity, when domesticated that is, tend to die of consumption, as witness the records

of Zoological Gardens in all countries. Another example of the folly of defying the obvious decrees of Nature could be drawn from the avoidance of sunshine, which was rampant among our Victorian forebears. Blinds were pulled and curtains drawn, to prevent the fading of carpets, furniture, and wall-papers, regardless of the fact that after fresh air, sunshine is the most potent of all purifiers. From this particular heresy we have been moving slowly away for at least two generations, but very slowly. The tonic and curative effects of sunshine have been tacitly admitted in the practices of people during the annual visit to the seaside—and otherwise—but the systematic application of the truth has been almost entirely confined to institutions in Switzerland and elsewhere.

Other examples could be drawn from our clothing. The tight corsets and still tighter dog-collars which were formerly the fashion have slowly given place to more rational modes, though the dog-collar, or its representative, a tight, throat-cutting, velvet band, still disfigures the necks of elderly ladies. Our present-day food is of course the most fantastic and foolish defiance of Nature's

laws which it would be possible to imagine, but that is a long story to be considered later. Here it is only necessary to remark that Nature did not invent the cooking stove. Even in matters where the genus homo may justly vaunt his superiority over all the other animals, namely, brain and nervous system, recent researches tend to reveal how essentially animal he really is. It is not necessary to subscribe to all Freud's theories and the deductions therefrom to realise that the groundwork of his contentions is sound, and that we are far more definitely dominated by the sex side of our nature than it is altogether pleasant to have to admit. That prevention is better than cure, is a well-worn adage, largely acted upon in most matters, save only in those of health. The curing of disease is a very difficult matter; the prevention of it a relatively simple one. It would indeed be scientifically true to say that human intervention does not, and could not of itself, cure any disease. It is the desire on the part of Nature that every one should be healthy, and the enormous trouble she takes to ensure it in each individual, which really does the healing. When, for example, a man is

attacked by a fever, say typhoid, the modern doctor does not attempt to "cure" it: he waits and sees. He knows full well that any efforts on his part may counteract and nullify the defensive measures which he knows Nature to be taking. He therefore concentrates his attention on good nursing, sensible feeding, relief of pain, and the forestalling of complications. The belief that the pharmacopœia contained a "cure" for every ill to which flesh is heir still obtains amongst a very large number of people who ought by now to know better. Drugs can relieve pain and discomfort; they may even help to minimise the effects of a successful invasion, but they cannot drive the enemy out, bag and baggage, as some people still fondly believe them to be capable of doing. Vaccines which are now so much the vogue are in a different category. They are given in order to stimulate the natural defences. When these defences are at a very low ebb there is no response: it is like whipping a tired horse; so that this method of treatment, useful as it is, must be employed with judgment and understanding. In the sixteenth century disease was firmly regarded as a visitation of the Almighty, and there are

not wanting those who still subconsciously so regard it. It is of course nothing of the sort. Disease is due to a defiance of Nature's laws, either in the individual or the community. We are beginning to understand and interpret those laws, and the further we get, the more obvious does it become that those laws are hard laws—the laws of the hunter and the sportsman, not the soft laws of the French *chef*, the hot bath, and the Rolls-Royce. Great advances have been made in recent years in safeguarding the health of the community. Local authorities insist upon good drainage, pure water, clean milk and the like—with excellent results on the death-rate and the incidence of disease, but the individual continues to contract disease largely through his own ignorance or stupidity.

Darwin and Huxley were the great pioneers in showing us man's kinship with the rest of creation; they warned us that there was nothing transcendental about the genus homo. It is difficult for those of this generation to realise the storm of indignant protest which this conception originally evoked. Not only were those scientists who hailed Darwin as a seer, denounced from pulpits, but they

were even excluded from drawing-rooms and threatened with expulsion from West End clubs. The obloquy with which they were pursued has probably had no parallel in history, and it is quite certain that had he lived at an earlier date, Darwin's books would have been burned by the common hangman and he himself would have suffered death by torture. But truth is greater than prejudice, and nowadays not even the most bigoted theologian will be found to attack the surely established stronghold of evolution. The first chapter of Genesis is admitted to be an allegory.

It is probable that Darwin's theories would have been more readily accepted had they not been misrepresented in the first instance. His teachings were said to rest upon the supposition that man was descended from monkeys. He did not of course teach anything of the kind : he taught that man and the apes both ascended from a common stock. The position may be graphically explained by reference to a capital letter **Y**. The common stock is the stem, the monkeys are on the left arm and man at the apex of the right arm. So that although it is not contended that man is descended from the

monkeys, there can be no question about the cousinship between the genus homo and the higher class of apes, called the anthropoid apes. The representatives of this class are the Chimpanzee, the Gorilla, and the Ourang. Some classifications include the Gibbon and the Lemur.

But even the concept of cousinship is extremely distasteful to some sensitive minds. The belief that God created man in His own image is a "credo" so satisfying to some people that they decline absolutely to allow even the outline of an ape into the solemn picture. One of Voltaire's most pungent epigrams refers to this matter. "If," he said, "it be true that God created man in his own image, then it is still more true that man has abundantly returned the compliment by thinking of God as though he were a man." The facts in support of this cousinship between man and the apes are so many and so telling that even a cursory glance at them is sufficient to bring conviction. It may, for example, surprise some people to know that human children are sometimes born with definite tails, containing blood-vessels, nerves, and muscles; such, nevertheless, is emphatically the case. Mr. R. G.

Harrison described one in 1900, and Dr. Paul Sarasin described another as recently as 1914. They are of course rare, but they are not to be gainsaid.

The relationship between the genus homo and animals still lower in the scale than the monkeys, the animals, that is, which occupy the stem of the Y, is shown by a phenomenon which is by no means rare. Every doctor is familiar with the fact that there are some people, male as well as female, though chiefly of course female, who have supernumerary nipples. There are several cases where the full complement of seven on each side, extending at regular intervals from the armpit to below the waist-line, have been observed and photographed. This reversion to a more primitive type is an example of what is called degeneracy. There are others, rather less salient perhaps, none of which can be explained on any theory which excludes the operation of the now recognised laws of evolution.

But to return to the question of our cousinship with the apes: it must not be imagined that the superiorities are all on the side of the genus homo. In the matter of the eyes, for example, the apes are our

superiors. The eye of the lower animals, the horse for example, is placed laterally in the head ; it looks outwards and backwards as well as forwards, with the result that the two eyes do not see the same thing at the same time. To such an animal everything in the picture is on the flat ; there is no perspective. It is only when the two eyes are directed forward and an object is seen with both eyes simultaneously, that stereoscopic vision or perspective vision becomes possible. Anyone may test this for himself by closing up one eye. His sense of perspective is immediately abolished, and he is unable to gauge the distance of one object from another. Moreover, unless an object is quite familiar to him he will be unable to decide whether it is really big, or whether it looks big merely because it is near to him. It is this last consideration which explains, in part at any rate, how it comes that large animals with laterally placed eyes are afraid of so relatively small an animal as man.

Now, in this respect the larger apes, the anthropoids, are better equipped than we are. Their eyes look straight forward in the same place, like the lenses of a field-glass, with the result that their vision, especially

for distance, is far more stereoscopic and accurate than ours is. Our eyes are placed more laterally than theirs; we have not reached so high a stage of development in the adaptation of a special means to a special end. This is one example from among many, which are familiar to biologists, of the fact that man is not always and in every respect superior to the lower animals. His equipment for a particular purpose is often inferior to that of some lower forms.

In the matter of the emplacement of the eyes in the head there are considerable differences not only between individuals, but also between races. There is a very general opinion, especially among women, that a man whose eyes are close together is untrustworthy. As women are very intuitive, there is probably some truth in this. It is certain that such a man, physically speaking, sees more clearly than his fellows. That he also sees more clearly mentally is quite possible, and it may be on this account that he is distrusted by those who have anything to conceal. Shelley, whose eyes were very wide apart, was called by Matthew Arnold an "ineffectual angel," and most people of the same ocular type will be found to be dream-

ers rather than men of action. The greatest divergence in this respect among races is to be found in the Eskimo and the Chinaman. The former has eyes very close together—forward eyes; the latter has eyes which are wide apart—lateral eyes. The almond-shaped eye with the outer angle going upwards as well as outwards, the celestial or mongolian eye, as it is called when occurring in Europeans, is characteristic of a certain type of degeneracy called mongolian idiocy.

It is of interest to note that the evolution of the forward eye has been effected at the expense of the sense of smell. Anatomically this is obvious enough; the more the two orbits are approximated towards the middle line of the face, the greater is the encroachment upon the true nasal area. The sense of smell in man is, in truth, a very poor thing compared to what it is in most of the lower animals; in monkeys it is still poorer. It is certain that smell is to us a far less important sense than sight, and when we consider that where men are herded together in communities the vast majority of smells are disagreeable, it may be regarded as a great advantage that the acuity of this particular sense has been diminished. It is well known that con-

stant stimulation of any organ will eventually blunt and finally abolish its sensitiveness, and it may easily be that by herding our population into towns where all kinds of odours assail the nostrils, we are gradually diminishing even such nasal perceptions as the encroachment of the eyes upon the organ of smell originally allowed us. The power of the sense of smell in recalling associations is inherited in us from some lower forms.

These facts and considerations have been marshalled in order to show that man's place in the scheme of things is among the animals, and not among the angels. The logical conclusion of Darwin's teaching and its practical outcome is that man's higher nature is subservient to his lower, that the angel within him cannot grow and fructify unless the barbarian within him is at peace with himself. He cannot be at peace either with himself or his neighbours unless he cultivates physiological harmony by obedience to the decrees of healthy animal existence. Those decrees are written in the book of Nature, and if they are studied without prejudice or *parti pris*, they will be found to contain all the law and the prophets.

Microbic

The teachings of Pasteur and Lister concerning the causation of certain diseases by microbes or germs were almost as revolutionary in their way as the teachings of Darwin and Huxley. The germ theory, as it used to be called, is now not only universally accepted, but it has served as the foundation-stone for the erection of a new, elaborate, and ever-advancing branch of science known as bacteriology. In common with so many other discoveries which have thrown a flood of light into the dark places of knowledge, there has been a tendency to magnify the importance of the part which ought legitimately to be assigned to bacteriology in the scheme of our workaday lives. There has been too much panic and too little perspective. The conception which so long monopolised the field was that of civilised man going about his duties surrounded by malignant but invisible microbes against whom he was practically powerless unless he was drenched in antiseptics. This pessimistic point of view left some very important considerations out of the account. The first was that antiseptics are dangerous things; that what in the way of germicides will kill

germs will also destroy the tissues which the germs are endeavouring to attack; moreover, germs are so ubiquitous and so prolific that any attempt to do away with them by partial and local destruction is both foolish and futile. Another fact which failed to emerge for some time after the original discovery, a fact which is even to-day insufficiently appreciated, is that a large number of the microbes which cause the most deadly diseases are in permanent residence within our bodies. When all is well with the organism these microbes are powerless; they are held in check; it is only when circumstances reduce the authority of our natural policeman, and impair the activities of our natural scavengers that the enemy is able to mobilise and attack us in mass formation. The microbes of tuberculosis, of pneumonia, of diphtheria, of typhoid fever, and many other dread diseases, do not necessarily come as alien intruders from without; more often they have been inhabitants of the citadel for a long time, awaiting an opportunity to pounce. The occurrence of any such diseases more often means the exhaustion of the defence than any considerable reinforcement of the attacking party.

It used to be the fashion to attribute all kinds of obscure ills to still more obscure chills; to have "caught a chill" was considered a sufficient diagnosis. Such generalities are no longer accepted; it is now necessary to furnish the name and address of the causative microbe. The chill theory nevertheless survives in the widely held view that the occurrence of a chill or the exposure to cold brings about such a depression of the vital forces as to give an opportunity to certain of the inhabitant microbes to pounce and cause symptoms. If this be true—and there can be no doubt that it frequently is true—it means that the vital forces of the victim are very easily depressed. The normal healthy organism reacts vigorously to cold influences; it is only the poisoned organism which fails so to react. The fault then is clearly not with the cold influence but with the individual whose bodily state fails to react adequately to a normal stimulus. It is the man who lives a cotton-wool life, dreading draughts and cold influences, who succumbs to a "chill." The outdoor man, or the sedentary liver who keeps himself in training, never "catch chills." Their defensive reactions being vig-

orous and prompt, they can afford to snap their fingers at the inhabitant microbe; and they do.

The real explanation of the vast majority of "chills," however, is far otherwise; for chills, or exposure to cold, have no place in the picture. The real picture portrays stuffy, unventilated rooms: concert-rooms, theatres, restaurants, churches, peopled by overfed and constipated persons, the only muscles of whose whole body which are well exercised are those of the lower jaw. The enemy microbes which saturate the atmosphere advance in mass formation and gain an easy victory. Two days afterwards the victim expects that he "caught a chill" coming home from the theatre.

The great defect in the attitude of the public towards disease in general and microbic disease in particular has been and is a panic-stricken exaggeration of the strength of the enemy and a ridiculous under-estimate of the powers of defence. A sober, well-balanced estimate of the situation would take into account and place in the foreground, the fact that microbes are much older than man, and that if the microbes had really been possessed of all the potencies

attributed to them, they would long ago have wiped man off the face of the earth. A single species of microbe, that of tubercle, would have sufficed to do that unaided. It is not necessary to belittle the admitted power of the microbe in order to realise the far greater power of man over the microbe. And man has so far defeated the microbe, not by antiseptics, nor vaccines, nor sera, but by such natural defences in his blood and tissues as have enabled him not only to survive, but to increase in number, knowledge, and power. The recognition of the microbe, the study of his ways, and the means to counteract him, are beneficial preoccupations of science ; but the apotheosis of the microbe, his aggrandisement, and his investiture with supreme powers, are acts as pusillanimous as they are puerile. The real antiseptic is manufactured in the tissues of the human body, and is more than sufficient both in quantity and quality for ordinary occasions. The extraordinary occasions on which it fails may indeed be caused by microbic attacks from without, as when an exhausted person drinks deeply from a polluted well. It more often happens, however, that the cause is to be sought in the persistently unwholesome

life which the victim has recently led, a life in which the supreme laws of healthy animal existence have been defied, a life lived in stuffy, airless rooms; a life of muscular inertia, of overfeeding and under-drinking, in which the natural defences of the body have been starved of their sustenance. To blame the microbe is so easy; to live cleanly so difficult.

It follows that the natural antiseptics of the body are to be found within the body itself, when this is whole and wholesome. And it is kept whole and wholesome by the great natural antiseptics, which are eternal. These are sunlight, fresh air, pure water, and muscular exercises, a combination which is more potent in warding off disease than even the slyest and most subtle germicides which ever issued from a chemist shop. This is not to say that germicides are useless. On the contrary, if we were now deprived of them, a great many surgical operations would become impossible, and a great many epidemics would be even more epidemic than they are. Germicides have their place in the scheme of things, and rightly occupy an important position in many spheres. It is nevertheless a one-sided and dangerous heresy to regard

them as omnipotent. It is, for example, among the many limitations of the germicide that it is entirely devoid of discrimination : it attacks friend and foe alike. Now, the human organism contains many microbes which are entirely friendly. Some of these are engaged upon such essentially beneficent work as digestion, others are busily engaged upon ferments, enzymes and such-like, while a large and varied army of them are for ever producing antidotes not only to the poisons which enter the body from without, but to those which the body itself manufactures in the course of the daily tissue change.

If into this delicately balanced engagement, in which, though the fighting never ceases, the body is always the victor, a new element in the shape of a chemical germicide is introduced, the casualties among the just microbes are likely to exceed the casualties among the unjust, and serious harm may be inflicted upon the winning side. It is of course true that doctors rightly administer germicides in conditions such as typhoid fever ; but in such cases the unjust microbes have gained so enormous an ascendancy over the just that an impartial brutality of slaughter is calculated, on balance, to benefit the body.

Neglect to apply to our everyday lives the now universally admitted fact that a germicide is a two-edged sword has brought about some curious and lamentable consequences. It has, amongst other things, created diseases which had no existence before the advent of antiseptics. The disease known as pyorrhœa offers a simple though salient example. The disease itself is real enough, as may be seen from the fact that the fashionable treatment consists in the fierce and fantastic extraction of all the teeth. Now this unpleasant, unsightly, and debilitating disease was not known before the invention of antiseptics. In the fervour of conversion to the new crusade against deadly germs, every one took to using antiseptic tooth powders and pastes and mouth washes, with the result that the friendly germs which are quite capable, when left alone, of holding their own, became so decimated and attenuated by the diligent application of potent remedies against imaginary ills, that their defensive power became completely annihilated, while the enemy microbes which receive large reinforcements at each meal flourished and multiplied exceedingly, so that the gums became a soil on which any malignant

microbe might be sure of a warm and spongy welcome.

It is not of course suggested that abuse of antiseptics is the sole cause of pyorrhœa. The disease is not uncommon among the classes which never use a tooth-brush, much less an antiseptic powder or paste. In these, as in many other cases, the picture is complicated by several causative factors, some of which are considered later. It is nevertheless the case that the mouth, like the nose, and all the organs for that matter, but more particularly the nose, is capable of facturing its own antiseptics, which it does with outstanding success unless its primitive methods are mangled by the meddlesome hand of man.

Another instance of how the incontinent and indiscriminate fear of the microbe may lead to most lamentable results is presented by the latter-day attitude towards that most nutritious of all fluids—milk. Before the microbe was enthroned, milk was rightly regarded as the innocent staff of infantile life. The microbe has promoted it, potentially at any rate, to the position of a pestiferous poison, to be tendered to the tender in fear and trembling; and then only when

it has been subjected to the most deranging process known to physics, namely, boiling. Boiling is the most efficacious method of sterilisation. It is the expedient adopted by the surgeon to render his instruments innocuous. "If, then," said the microbists, "we boil our children's milk we shall inevitably kill all our enemies and deliver our darlings from danger." And so it became an article of faith that all milk should be boiled, lest its consumption in the crude state should give rise to tuberculosis and kindred corruptions. The propagation of this pusillanimous gospel has cost the country dear. It was started in the early nineties, and so successful was it in devitalising the rising generations that by the outbreak of the Great War we had become, so far as our combatants were concerned, a C3 nation. For the process of boiling not only kills the microbes in the milk, but at the same time it destroys the vitamines—which, as will appear later, in addition to being the puissant and pressing enemies of the microbe, are an essential to the growth, development, and well-being of the individual. Such diseases as rickets, adenoids, and appendicitis (to mention but a few of those which take a

heavy toll of life and efficiency) were unknown to medicine before the microbe, the kettle, and the crucible, came to constitute a creed.

Nor must it be supposed that even the most malevolent microbe, say the bacillus of tubercle, is wholly and entirely malevolent; the reverse is the case. His presence in our bodies in reasonable numbers is not only harmless but actually and actively beneficial. Like the carp in the pike pond, he keeps the defences on the alert, and trains them to withstand and nullify his own and kindred activities. It is only when he is able to adopt stock tactics and advance in big battalions that he becomes dangerous. His single spies are excellent: they train us to resist him when we are young, and as the years advance they keep us up to the collar. Now, among the many counts in the indictment which can be brought against the boiling of children's milk, the destruction of these single spies must be regarded as among the most serious. It is essential that the young should be gradually trained to resist disease, and if they are kept in a sort of cotton-wool atmosphere under a glass case, it is obvious that such training cannot take

place. The defences are there waiting to be trained, but if they are protected from all necessity for effort, they atrophy from disuse; and when the attack comes—as come it must—the first engagement is likely to be the last. Common sense and hygienic principles applied to public health have had an enormous effect in reducing the infant mortality. What has militated more than anything else against a still greater reduction has been the insensate fear of the microbe coupled with the devastating neglect of the defences.

These and similar attempts in divers directions to substitute the hasty and ill-considered findings of a pseudo-science for Nature's resolute, robust, and obvious intentions have led mankind into many a blind and dangerous cul-de-sac. The genus homo sapiens has arrived at the present stage in his upward pilgrimage, first by trusting to Nature and ultimately by studying humbly to understand her ways. When he arrogates to himself a wisdom which is wiser than hers, he pays the inevitable penalty of desolation and death. The kingdom of health, no less surely than the Kingdom of Heaven is, with us and within us, a sacred vineyard to be cultivated with prayer and fasting.

Economy of Energy

In each human being there is a certain stock of energy. The amount of this stock varies with the individual; in some there is a great deal, a superabundance even, whilst in others the sum total is relatively small. But whether it be considerable or inconsiderable, it must suffice for everyday needs. Now this communal energy is intended to be distributed more or less impartially among the various organs and systems, and it follows that if one organ or system can succeed in attracting to itself more than its own fair share, then some other organs or systems must suffer a relative deficiency. The deficiency thus produced may declare itself either in the body as a whole, leading to a general lack of vigour and intensity, or, as is more common, it may become apparent in the faulty behaviour of some particular organ or system. The decision as to which particular organ or system is to suffer deprivation so far as our present knowledge goes, seems to be determined by mere caprice so that, given a leakage of energy in one spendthrift organ, the corresponding deficiency may seemingly declare itself any-

where. Now it is obvious that if the balance is to be redressed and a due equilibrium of energy re-established, it is above all things necessary to prevent the spendthrift organ or system from continuing its squandering propensities. This principle is well understood and acted upon in the matter of what is called eye-strain. Slight visual defects in those who use their eyes a great deal—as who does not?—cause a determination of energy to the organs of sight, with a resultant deficiency in some other organ or system. No treatment of the symptoms in the suffering organ or system will ever bring relief until the original trouble in the eyes has been detected and corrected. This necessity for the equitable distribution of physical and mental energy has a very much wider application than the explanation of eye-strain, to which it is too often limited. The same principle is discernible in a far greater number of cases of what may be called stomach-strain. When food is put into the stomach in excess of what the organism requires, if it be not vomited, as in the case of children it frequently and mercifully is, a great deal of energy is required to dispose of it. The superfluous material must be dealt with in

one of two ways. Either it is voided by the increased activity of the bowels, kidneys, and other excretory organs, or it must be converted into fat, and stored in appropriate inartistic positions. In either case the process involves an enormous expenditure of precious energy, much of which has been stolen, as it were, from some other organ or system. Is it any wonder that so many people are stupid and somnolent after food, especially when that food, as will presently appear, is for the most part so devitalised as to demand an extra dose of energy to render its assimilation possible? The present furore for over-consumption of devitalised foods—and the devitalisation is one cause of the over-consumption—shows itself in the prevalence of that major malady of modern civilisation called constipation. The useless expenditure of energy in the higher reaches of the gastro-intestinal tract, the digestive, directed to the necessary disposal of unnecessary victuals, inevitably means a corresponding lack of energy in the lower, the excretory, reaches of the same tract, with the result that the necessary activities of the latter are sadly impaired. The retained material is re-absorbed, and the tissues

of the body are drenched with poisonous material. The natural defences are overborne, and the unmolested microbe enters quietly into its kingdom.

And not only the microbe; for all disease is not microbic. Much of it is metabolic, due, that is, to a faulty interchange of the bodily fluids, salts, and gases. This is brought about by the incorporation of effete material which, having escaped excretion, is retained and reabsorbed. The retention is due to the lack of energy in the excretory organs caused by the illegitimate expenditure of energy in the digestive organs. There is too much intake and too little output, with self-poisoning or auto-intoxication as the far-reaching result.

Lack of economy of energy, considered in this sense of one organ or system robbing another organ or system of the latter's legitimate due, has many further applications. One of these is to be found in the management of minor maladies of short duration. If we look at the behaviour of lower animals when they are indisposed, we cannot fail to notice that they resolutely turn from food of all kinds until they are practically well again. Now, these creatures act in this way

from an instinctive knowledge that food does them harm. They do not, of course, know why, for their instincts are superior to their reason. It would be well for us if we were more often to profit by the lessons which a study of their instincts afford. Our behaviour in similar circumstances of indisposition is the exact opposite of theirs. We take large quantities of concentrated food "to keep up the strength." It is only necessary to apply our formula of the economy of energy to realise what a stupid procedure this is. When a person falls ill, it means that his defences are fighting a severe battle. All the available energy of the organism is therefore required by the defences to overcome, let us say, a microbic invasion. If a large part of this precious defensive energy is diverted from the seat of operations to the digestive organs, it is obvious that the victory will be less complete and longer delayed than it would have been if the diversion had not taken place. The practical outcome of this is that on the occurrence of any of the slight affections which are treated domestically rather than medically, e.g. a "cold," it is a good rule to abstain altogether from food until there

is a real, as opposed to a fictitious or suggested, desire for nourishment.

Parenthetically it may be said that of all the false gods worshipped by a stupid, stiff-necked, and satiated generation, that which cajoles men into "keeping up their strength," by piling up their platters, is the most devastating and disgusting. More people are floated into their coffins on a flood-tide of fluid food than ever die of disease or degeneration.

Under such terms as neurasthenia, nervous exhaustion, and the like, it is the fashion to indict the central nervous system with spendthrift propensities. Such a diagnosis is the more eagerly acceptable because of the flattering belief that there is, in the genus homo sapiens, a transcendental element which is conferred upon him by his admittedly superior nervous system. This nervous system, especially when cultivated and cultured, would seem to be of so delicate an organisation that its equilibrium is easily upset by causes so intangible and esoteric as to be unintelligible to the underbred. To suffer from neurasthenia is therefore to carry a label of social superiority whose very vagueness renders it the more precious.

Now, nervous derangement and nervous debility are conditions which have unfortunately a very real existence, but they do not arise from any special delicacy or refinement in the victim's nervous system. They may arise, as in the case of war neuroses, so-called shell-shock and the like, from real shocks acting upon an otherwise normal nervous system, hitherto unaccustomed, and therefore not inured to shocks of such a nature ; a want of training, in fact, in resistance to a new kind of shock. Or they may be caused by ordinary strains acting upon a nervous system whose stamina has been stealthily sapped by some other organ or system. Save in circumstances of severe public or personal upheavals the first set of causes are seldom operative, while the second set are very commonly in cause. Eye-strain and stomach-strain have already been mentioned in this connection. Another example is furnished by what is called a failure in adaptation to environment, as when a lad of the artistic temperament or the outdoor, is placed in the wholly uncongenial dry-as-dust atmosphere of a lawyer's office, in which, instead of legitimate self-expression, he is obliged to bend all his energies to

pathetic self-repression. Failures of adaptation are by no means uncommon, and although they represent the over-expenditure of one part of the nervous system to the detriment of another part of the same system, they come within the formula of the uneconomic use of energy which we have just been considering. Exhaustion of the nervous system means the exhaustion of the higher centres, which is brought about under circumstances such as those just enumerated; it is not, as some people seem pleased to imagine, caused by overwork in a well-balanced and perfectly healthy body. Neurasthenia is not a disease of the high born; it is indeed not a disease at all. It is a label behind which the dust of simple flattery is cast in the eyes of the credulous.

What I have ventured to call stomach-strain is the most serious evil of the present dispensation. Every one admits that every one else eats too much, but no one is willing to profit by the awful example which his neighbour presents. This is presumably because the awful examples are in such an awful majority that they naturally regard themselves as normal. The physiological function of food is to repair the waste which

the ordinary exercise of the bodily functions entails. A slight margin over and above the line of the strictly necessary may be regarded as prudent if not advantageous. Anything in excess of this slight margin entails the useless expenditure of a very considerable amount of energy. Very early in man's evolution it was brought home to him that his precarious nomadic life necessitated long periods during which he was unable to procure food. It thus became his habit in the presence of an abundance of food to eat a very large quantity, the surplus over his immediate necessities being stored up as fat. In this way he had a reserve to call upon during the periods of enforced abstinence. The stomach does not think: it acts. It does not reason why food is put into it, but as soon as it is aware of the presence of food it sets to work to dispose of it. If the food is not required by the immediate needs of the organism, the stomach calls upon its congeners, the pancreas, the liver, and other glands, with an S.O.S. call, and together they labour to convert the food into material suitable for storage in the individual's granary. These busy and dutiful organs store the surplus in such a form and manner as to

render it available for immediate use in response to a physiological demand. Now, the important point to realise is that this team work of the digestive and storage glands entails utilisation of a very considerable amount of energy, much of which has to be borrowed from other organs. If there should ensue days of abstinence, this loan is repaid, as it were; for during days of fasting the stomach, liver and pancreas are idle, and require no energy. If, however, there should be no days of abstinence, and if the storage of unnecessary food proceeds steadily from day to day, it is obvious what must happen. The daily increment of lard is laid up at the expense of other systems; the digestive organs, being never allowed any rest, become worn out and inefficient, and fat accumulates to disgrace the outline.

Nature appears to have made one of her very few miscalculations when she allowed that the taking of food, not the satisfaction of hunger, but the process of feeding, should be in itself agreeable, and permitted man in times of plenty to go on eating in obedience to greed, long after the pangs of hunger had been satisfied. It is no doubt true that Nature ultimately revenges herself very

heavily for such indulgence on the part of man, and the marks of her displeasure are writ large on the faces and figures of the vast majority of people of over forty years of age. Unfortunately, however, the marks of her nemesis, unmistakable in full efflorescence though they be, are so insidiously developed that people are unable, as they are certainly unwilling, to associate cause and effect. For it is only too true that the marks of Nature's displeasure are so universal that they are actually regarded as inevitable. To realise this it is not necessary to call in aid such graphic expressions as the "middle-aged spread," in daily use, to describe an everyday observation of the most casual. We can appeal to the business-like methods of life insurance companies, to whose advantage it is to look very closely into such matters. Many of these companies publish what are considered by them to be average, and therefore acceptable, weights of people at certain ages. It will be found that all such tables allow people of the same height to be considerably heavier at the age of fifty than at the age of twenty. For instance, a man of 5 ft. 5 in. who weighed 9 st. 9 lb. at the age of twenty, is allowed, without

unfavourable comment, he is indeed expected to, weigh exactly a stone more at the age of fifty. This increment is due entirely to the deposit of superfluous fat, which not only degrades the outward seeming, but correspondingly increases the amount which the already ageing heart is called upon to perform. When we consider the difference which the infliction of an extra pound on the back of a race-horse will make to its winning capacity, what possible reason can be found for excusing the infliction of an extra fourteen pounds upon a physique which is past its prime? That Hamlet was middle-aged was not a sufficient reason for his being scant of breath. "Our son is fat" was the real explanation.

The proper attitude towards collops is to live in fear of them. Not only because they are unsightly, but because they represent both robbery and slavery. Robbery of energy in their creation, and slavery of other organs in their maintenance. Chief among the organs enslaved is that most important of all organs, the heart. For not only does every pound of superfluous flesh represent an increased amount of work cast upon an organ which knows no rest, but the organ

itself is liable to become so overladen with fat that it is deprived of its legitimate elbow room. The avoidance of collops is a simple matter; their dispersal is a serious one. The cultivation of restraint in the matter of food is quite easy. Unfortunately, it is a virtue which is preached even less frequently than it is practised. On the contrary, it is over-indulgence which is not only preached but pushed. The fallacy of "keeping up the strength" is dear to the heart of those who have the care of the young. With woman especially, food and more food is the infallible panacea for every plaint. She loves to "feed the brute," and on the rare occasions when the brute is moved to protest, she charges him with treating her tenderest solicitude with heartless contempt. Then he succumbs. But the "brute" matters less than the child; the former need not succumb because he can know better; the latter must succumb for it cannot know better. And the overfeeding of children, coupled with their overclothing and otherwise coddling, is the cause of that depression of their defences which is the real explanation of their often infirmities. If in the future they are successfully to fight with microbic beasts at

Ephesus, they must be delivered from the surfeit of food and the load of cotton-wool which are now oppressively imposed upon them. It is said that as soon as a child is born it begins to die. It does not really begin to die until it is weaned: it is then that the feeding-up begins.

It is a surprising thing that, many as are the fat, there are not many more. The dietetic practices of the classes which are called black-coated, the people, that is, who live by their brains rather than by their muscles, are so fantastically on the side of excess that a spare figure ought really to be even more phenomenal than it actually is. The daily food consumption of such people amounts to four fat meals a day, with, not altogether infrequently, a fifth, in the shape of a glass of milk, thrown in, either at 11 a.m. or at bedtime. These are the same people whose business preoccupations preclude them from any but the most perfunctory muscular exercise. Of these four meals, the bacon and egg breakfast, the meat and pudding luncheon, the cake and bread and butter tea, and the fleshy dinner, each one takes about five hours' hard digestion to digest, and the four are crowded into a

waking day of sixteen hours. It is only necessary thus baldly to state these facts to render comment superfluous. Before one meal is disposed of, another is placed in the tired and astonished stomach. By the end of the day this complacent organ is fatigued, and the last meal, which is usually the heaviest, is but very partially digested when its possessor goes to bed. He craves our sympathy because he suffers from insomnia. Of course he does; and if he does not, he deserves to. If such a man were to overwork his horse as he habitually overworks his stomach, he would suffer imprisonment and obloquy in place of insomnia and obesity. In order to find salvation he must do one of two things. Either he must decrease his daily intake or he must return to the practice of primeval nomadic man, and balance the account by several days of abstinence.

It is one of the drawbacks to the sporting habits of the English that these habits beget in the young a perfectly legitimate desire for plenty of food. When the serious business of life reduces the opportunities for sport and exercise to a relative minimum, there should be a corresponding decrease in the

intake. But there seldom is. Plenty of outdoor muscular exercise justifies a liberal intake, but in the absence of the exercise nothing can justify the liberality. When a man settles down to a sedentary life he should immediately sit down to reduce the amount of food which he has been accustomed to consume, and the reduction should be apparent in the quality as well as in the quantity.

But, first of all, as to the quantity. A large and heavy blue pencil should obliterate the words "afternoon tea" from out the schedule of any sensible, self-respecting, civilised community. Of all the inventions with which a cunning spite seeks to lure people to physiological perdition, this stodgy assemblage of saccharine and starchy horrors, insinuated between luncheon and dinner, is at once the most indefensible and the most deadly. One of the worst features about this subtle, sly, and specious self-indulgence is that it has managed to surround itself with an atmosphere of smug, social respectability. It manages to masquerade as a harmless excuse for uplifting conversation, whereas it is in reality a medium for sustained and steady satiety, in comparison

with which an occasional bout of vinous excess is physiologically venial.

The Englishman's breakfast, like his house, is his castle. Its foundations are laid in porridge; it is battlemented with bacon and eggs and bread and butter; its minarets are of marmalade—in all, a mortal gorge which should move any moderate man to exempt his stomach from any further ordeal for at least twenty-four hours. But no sooner is the castle disposed of, than the stomach is given a whole hamlet to subdue, in the shape of a meat-potato-pudding-cheese luncheon, and, drawing a veil over that terrible tea, the day's work terminates with a heavy engagement with a curious agglomeration of pied and pickled indigestibles, to be followed in due course by somnolence, insomnia, and nightmare. One might naturally suppose that it would be easy to reduce to reasonable proportions so grotesque an exaggeration of physiological needs. In point of actual experience it seems to be very difficult. The opinion which seems to be held with fervour and determination by the vast majority of people is that a man owes it to himself and his family, as a sacred duty, to eat as much as he can, whenever he can, in

order to "keep up his strength," and if anyone dares to suggest the contrary, he is regarded as a dangerous lunatic. Both the danger and the lunacy reside in the present practices.

If the Englishman would consent in this matter to learn a very useful lesson from his continental neighbours, he would realise that it is not necessary to begin the day with a square meal. The square meal is only a habit, a fact which is very soon brought home to those who travel abroad. Nor is it necessary to consume flesh foods and heavy puddings at luncheon. Lighter and more digestible fare, though it certainly fails to give that sense of rude and ruddy repletion beloved of the British belly, is nevertheless far better suited to the activities of brain which are usually required about that period of the day. In the matter of the evening meal more latitude is permissible. The day's work is done, and such energies as remain may legitimately be concentrated on the digestive act.

When people begin a regime of diminution and simplification they are apt to complain that they are pursued by an aching void, and that it cannot be right to leave a

" healthy " appetite unsatisfied. The contention academically considered is capable of being well sustained; unfortunately, however, the appetite in such cases is not a " healthy " appetite. It is, on the contrary, an unhealthy one, in every way comparable to a drunkard's craving for his dram. It is merely the desire of an overstimulated organ for further stimulation. Fatigue and restlessness are known to be frequent companions, even in the stomach.

In reference to a question which was partly dietetic, Dr. Johnson said, " I can abstain, but I cannot be moderate." There are probably a very large number of people who are in exactly the same case. At any rate, moderation in food is so rare even amongst those who are fully cognisant of the dangers of excess, that we are obliged to assume that to some people, probably the majority, moderation is quite impossible. With them " the appetite which comes with eating " is so insistent as to brook no denial, so long as there is anything left to eat. Which means that the vast majority of people are in this matter very little advanced beyond primeval nomadic man, who, mindful of the days of enforced abstinence to come,

literally filled himself when once he started. If Dr. Johnson's formula is of an application much more general than people would have us believe, it should not be a difficult matter for the modern gross feeder occasionally to abstain altogether from food. His usual habit of surfeiting himself three times daily would certainly justify fast of two or three days every quarter.

It is a curious fact, but it is a fact, that even for the veriest glutton, fasting is an easy matter. In anticipation, it is of course horrible in the extreme, but the reality once experienced embraces many pleasurable experiences. To begin with, there is the grim gratification of the grudge which every normal man harbours against himself. The gratification does not last long, however, because the discipline soon ceases to be a martyrdom. The first day is sad—that must be freely admitted; but the second is much less sad, and the third is not sad at all. One wonders *in*deed on this third day why it is that anyone ever eats anything. With the physiological balance thus thoroughly redressed, one feels so much better and lighter and younger, mentally, physically, and morally. The moral uplift is tremendous,

so much so that on returning to food, even of the most meagre description, one feels in some sense to have lost caste, and to have forfeited the right to be numbered among the elect.

It must, however, be distinctly understood that to attain to such beatific results the fast must be a real fast. A real fast means water to drink and absolutely nothing else ingested. Some people, for fear of "getting too low," will surreptitiously insinuate a cup of tea, a glass of milk, an apple—a species of backsliding which not only destroys the whole fabric of the fast, but makes the process much more difficult to bear. After a few hours, the human system realises that the stomach has no work to do, and the energy is dispatched to other organs. At the usual hours of meals there may be a note of pained surprise issued from the stomach, but it soon dies down and the energies continue their beneficent work elsewhere. If, however, anything requiring digestion is placed in the stomach, the energies are called back to do the digestive work, and if there is not sufficient work to do, the stomach clamours for more, and unpleasant feelings of real hunger are sure to result. A real fast

is easy to bear, a partial one is intolerable.

The object of a fast is to enable the energies to burn up the dust-heaps of stored superfluous food which are clogging the wheels of being. Normally and physiologically all food is burned in our bodies precisely as coal is burned in a grate. When too much fuel is present, some of it escapes complete oxidation, and instead of burning to ash, is converted into cinder. In the human body this cinder is the devil. It collects not only under the skin as fat, but, in different forms, it invades the arteries, the kidneys, the brain, and other important organs. It is very insidious; it advances by slow degrees, and when it ultimately declares itself in an unmistakable guise remedial measures are useless. He is a prudent man who insures against it by moderation in his intake; he is a wise and courageous one who, being suspicious of its presence, consents to take arms against it, and, by opposing, end it. It you want a long lease of contentment and good comfort, then you must attend to the repairing clauses.

Metabolic

The life of every living thing, be it plant or animal, is an uninterrupted rhythm of waste and repair. Every vital process, however seemingly insignificant, involves an expenditure of cell substance which must in the long run be rectified by material taken into the body from without, and so assimilated as to become capable of incorporation into the living tissues. Mr. Walter de la Mare expresses this truth tersely when he says, " What Miss T. eats, becomes Miss T." Upon which, taking Miss T. as a type, it were an obvious comment to remark that what Miss T. eats usually becomes her very badly.

In order that material taken in from without may be digested, assimilated and incorporated, it is obviously necessary that it should be of such a nature as to be susceptible of being influenced by the digestive processes. Extreme cases of substances which are by nature wholly indigestible are presented by stones and bamboo sticks. It would be difficult to the most vivid imagination to conceive of such substances ever being transformed, even partially, into

what for convenience we may call flesh and blood. On a diet exclusively composed of these and kindred substances Miss T. would inevitably starve to death. The external supply must then be suitable in quality; it must also be suitable in quantity. If the expenditure among the vital cells is great, as during the growing period, then the intake must be correspondingly great. If, as in old age, the expenditure is small, then the intake should be severely diminished. There is a balance which must be maintained. Insufficiency means inefficiency from exhaustion; excess means inefficiency from overloading. The first of these is very rare; the second very common.

Now, no material taken in from without is wholly and entirely suited to immediate and complete incorporation into the living tissues. However suitable the material may superficially seem for this purpose to be, we must realise that it has to be completely disorganised and disintegrated in the digestive organs before it can be utilised. However much a beefsteak may seem to resemble human tissue, so much of it as is capable of being utilised must of necessity be converted into a fluid form before it can

be absorbed. The portions of it which cannot be reduced to fluid, e.g. gristle, are discarded and passed out as waste through the bowels. It would be impossible here to follow the various processes to which the assimilable fluid is subjected before it actually becomes assimilated: suffice it to say that these processes are refining and selective processes. At each successive stage certain substances are discarded as useless or deleterious, and are immediately passed out through the kidneys, skin and lungs, after having been so elaborated as to render them capable of being thus voided. Part of this waste consists of the *débris* of the dead or exhausted cells which are to be replaced by the new ones, part of it consists of unsuitable material which surrounds the new cells when they are introduced, and part of it is material specially constructed to act as a stimulant to the body as a whole, or certain parts thereof.

Here, on account of its practical importance, it would seem appropriate to interpolate a word of emphasis on the essential fluidity of all assimilable material. Until food has been rendered completely fluid it is incapable of absorption, so that to demand

of the digestive and elaborating organs that they should do their work efficiently and without discomfort unless they are liberally supplied with fluid is equivalent to asking them to dissolve sugar without water, to make bricks without straw. The vast majority of people take too little fluid. When reckoned up at the end of the day, the amount of this all-important item consumed by an ordinary black-coated man must seem ridiculously inadequate in comparison with the amount of fluid which he loses from skin, lungs, kidneys and bowels. Thus, at ordinary temperatures the skin loses by insensible perspiration about two pints of water a day: the lungs give off nearly a pint of watery vapour: the kidneys void from three to four pints—in all about six to seven pints which ought to be replaced. Were it not for the fact that most of the food which we consume consists largely of water, this discrepancy between fluid intake and fluid output would give rise to very serious symptoms. It is not, however, necessary to consider extremes in order to realise that a relative deficiency of fluid intake may and does impair the smooth working of the digestive, assimilating and

excretory organs, in a degree which though slight enough to cause no immediate symptoms, may nevertheless be pronounced enough to fatigue the organs. Water is to the human system what oil is to a machine: an insufficiency gradually but surely ruins the bearings.

It is well known that vegetables and fruits contain a considerable quantity of water, but the actual amount of this fluid content is sometimes surprising. Thus, an apple contains 82·5 per cent.; a strawberry, 89 per cent.; a cherry, 84 per cent.; an orange, 86 per cent.; a lemon, 89 per cent. Vegetables are even more watery than fruits. For example, a raw cabbage contains 89 per cent. of water, a tomato 91 per cent. and brussels sprouts, 93 per cent.

The best way of restoring the fluid balance is by drinking pure water. Distilled water is undesirable: it is too searching. Most of the other fluids which people are in the habit of drinking, such as tea, coffee, cocoa, are not searching enough. A glass of water on waking, another before luncheon, another before dinner and one at bedtime is a fair allowance which it is not necessary to exceed.

The complicated processes which we call metabolism involve, then, the manufacture of waste products which the system is at great pains to discharge as soon as may be, and these waste products must pass through certain elaborating processes before they are in a condition to be so discharged. These are the central facts to be borne in mind. The great elaborators of waste products are the muscles, which are responsible for the production of the greater part of the body-heat. Most of the chemical changes which take place in the body are either dependent upon or associated with, heat production. It is the combination of these two facts which lends so much importance to muscular exercise. In the absence of sufficient muscular exercise an insufficient degree of heat is produced, with the result, above noticed, that food is burned to retained cinder instead of to dischargeable ash. The more active metabolism produced by muscular exercise means more complete combustion of waste products, a quickening of the vitality and functional power of every organ, together with a general sense of vigour and well being in the whole body.

There is no substitute for muscular exer-

cise. The temperature of the body may be raised by artificial expedients such as Turkish baths, but inasmuch as these expedients do not increase heat production, but merely prevent heat loss, they fail to contribute adequately to the increased blood flow through the muscles and to the necessary adjustments of heart and respiration upon which much of the efficacy of muscular exercise depends. The rise of temperature called fever which occurs in disease, is a pathological process, and need not therefore detain us. Suffice it to say that it represents a defensive measure on the part of the organism. The defences find themselves opposed to a poison which can be destroyed or at any rate limited, by a rise in temperature. It is for this reason that fever is produced, and it is interesting to note that both the degree of the fever and its duration are determined by the strict necessities of the case. One sort of toxin will require a high fever of moderate duration, another a slight fever of long duration, according to the resistance of the invading toxins. Nature does not waste her energies.

Though the main stream of body heat is produced chiefly by muscular exercise, it

has many tributaries. Chief among them are the direct rays of the sun, fresh air and certain nervous activities. The action of sunlight, though its beneficent effects have in a general way been recognised for a long time, has only recently been carefully studied from a purely medical and scientific standpoint, and the conclusions are not yet ripe for dogmatic statement. It is, however, possible to affirm at least two things in connection with it. The first is that a certain measure of it is essential to the genus homo. Without it he languishes and dies, just as surely as the green plant so deprived, languishes and dies. The second is that an excess of it is liable to produce very active and sometimes violent reactions in those who are unaccustomed to it. This last is a fact which should not be lost sight of by those who inhabit our northern climates, where there are but a few months in the year during which the sun shines powerfully. The nordic man is fair and produces protective pigment with difficulty, usually in the patchy form of freckles. When summer comes, he immediately proceeds to expose himself and his fair children to the direct rays of the sun—at the seaside and else-

where—in the belief that "you cannot have too much of a good thing." He basks in it. The results of this intempestive and usually sudden admission of the direct rays on to a surface which has known no sunshine for several months, are seen not only in superficial and more or less painful sunburn, but often in a profound disturbance of tissue change as expressed by muscular lassitude, digestive upsets and nervous troubles, all of which are usually ascribed to the liver, to raw fruit, to the sea-climate or other socially satisfying though scientifically unconvincing causes. The southerner has no such experiences. He is able to produce plenty of protective pigment; he is practically never deserted by the sun, and he is careful not to expose himself thereto more than he can help. He has a motto which says that only Englishmen and dogs seek the sun at mid-day. Moreover, the southerner, unlike the nordic man, wears clothes of a colour which protect him from the deleterious rays of the spectrum. His clothes are black or dark blue, whereas the Englishman when he sallies forth to seek the sun's rays, clothes himself from head to foot in white, which does not afford him one

tithe of the protection which an ordinary prudence would dictate. Sunshine, like food, is a necessity so agreeable that its abuse is the rule rather than the exception.

In this country it is fortunately no longer necessary to uphold the virtues of fresh air, academically at any rate. It is, however, only too true that the academic, as opposed to the practical, acceptance of the faith is still very much in the ascendant. Like the old Scotch lady who believed in love "in the abstract" the majority of people are content to pay lip-service to the principle while reserving to themselves a right to parsimony in the practice. Fresh air means oxygen, and though it also means other highly important things, it is to the basis of oxygen that its present consideration must be restricted. Oxygen is necessary to combustion, and combustion is essential to heat. We have already seen that the production of heat by muscular exercise and otherwise is the pivot round which all our vital processes revolve, and that sub-oxidation or partial combustion means the burning of food to cinder instead of to ash, with consequent clogging of the wheels of being. The genus homo is still an outdoor

animal, and though he may live indoors behind closed windows where he obtains just enough oxygen to permit of continued existence, he does so at his peril. It is said that enough air penetrates, even to the stuffiest room, underneath doors and through cracks in windows, to prevent people from dying of asphyxia. That is true, but this minimal quantity, though it may prevent immediate death from suffocation, does not prevent disease which leads to death sooner or later. If there is not sufficient oxygen to keep the human machine working full blast, then the defences are starved of their fuel, and disease becomes inevitable. What is required in this matter of oxygen is not the minimum, but the optimum, and experience has abundantly shown the optimum to be synonymous with the maximum. People live and sleep behind closed windows because they are afraid of draughts and chills. The successful treatment of consumption by a method which is but a combination of these two bogies is sufficient to dispel the stupid fallacy on which the fear is based. If there had been any truth in the "deadly draught and chill" theory, every sanatorium for consumptives would

long ago have become a shambles worthy of suppression by Act of Parliament. As a matter of financial fact, sanatoria are very profitable concerns.

In order to appreciate the rather complicated mechanism by which nervous influences contribute to the tissue exchanges called metabolism, it is necessary, at first, to consider an extreme case. It is an every-day observation that worry and anxiety produce a loss of flesh. That this is not due solely or even mainly to a concomitant loss of appetite is shewn by the fact that some people who do not lose appetite nevertheless do, in such circumstances, lose flesh. It is also a common observation that work in the study which is accompanied by little or no output of muscular energy, nevertheless provokes a very definite desire for food. It is therefore obvious that if the nervous system does not, as some contend, itself consume fuel, it stimulates the consumption of fuel elsewhere. The nervous system being so essential a portion of the make-up of the genus homo, its exercise and elasticity are obviously necessary to his continued well being. It demands food and consumes it; and this consumption entails waste and

repair just as in the case of the muscles. In order to keep well, then, just as a man must use his muscles in deference to his purely animal origin, so must he use his central nervous system in deference to his purely human attributes. Mental work and muscular work must proceed side by side. Even a relative disuse of either means insufficient metabolism and impairment of function.

Now, work of either kind, as it involves metabolism, connotes the manufacture of waste products which must be eliminated. The over-production of these waste products in the case of the muscles is attended by their accumulation in the system, because the excretory organs are unable to dispose of them rapidly enough. This is a familiar phenomenon in people who undertake feats of muscular endurance when insufficiently trained. It is not often that permanent harm results, (though it occasionally does) because the subsequent rest allows the emunctories to deal with the accumulated poisons. It must therefore be remembered that, though muscular exercise disposes of poisons, it also produces them. What is called "training" in young athletes is

directed, among other things, to bringing them into such a condition of physiological equilibrium as will ensure a proper balance between the production of these poisons and their ready discharge.

A familiar example of the process by which this balance is established is afforded by the production of what is called "second wind." At the beginning of exercise a man soon becomes breathless. This means that he is producing more poison than his lungs can comfortably excrete. So soon as he begins to perspire, another excretory organ, the skin, comes to the rescue of the over-burdened lungs, and the laboured breathing at once dies down.

In a manner somewhat similar, the working nervous system produces poisons, but so far as our present knowledge goes, it is unable of itself to dispose of them. These excreta of the nervous system have to be passed out by the blood stream, to be dealt with elsewhere. If they are produced in excess, as for example in fevers, and are unable to find exit rapidly enough, their retention gives rise to delirium and other minor disturbances of the mental processes.

The mechanism by means of which these

delicately balanced actions of waste and repair are effected, is the circulation of the blood. The circulation is dependent primarily upon the heart, which is at once a force-pump and a suction pump. The blood is forced through the arteries which spread out like the branches of a tree, becoming smaller and smaller in calibre the further they extend from the central pump. When they become very minute these vessels are called capillaries; they have very thin walls, and it is through these walls that the material for waste and repair passes into the tissues. If we take any particular mass of tissue, say a piece of living muscle, we have to picture the arterial blood carrying the sustenance to this bit of muscle and discharging it through the capillaries, the muscle in return giving its waste products to the capillaries which conduct them into the veins, through which they return to the heart, always supposing that they have not been intercepted and dealt with *en route*. When they have arrived at their destination in the heart this organ immediately passes them into the lungs, where they are voided into the open air and their place is taken by oxygen. The

blood thus purified and oxygenated now returns to the heart, and is once more despatched upon its journey to the peripheral organs. This exchange of new lamps for old by the arterial blood, and old lamps for new by the venous blood, continues all through our lives. The heart never rests. It is tireless and seems everlasting. It is the most saintly of all organs. However badly it is treated, however poisoned the blood which reaches it, however overburdened with illegitimate work it may be, it pursues its allotted task, frequently against frightful odds, patiently, perseveringly and unobtrusively, until it can do no more. If one quarter of the consideration were given intelligently to the heart which is grossly and stupidly squandered upon the stomach, the work of waste and repair would not only be a painless, but a pleasurable process.

By this, I must not be understood to suggest that people should live in fearsome consciousness of the fact that they possess a heart, should feel their own pulses or measure their own breathless disabilities. Very much the reverse, for there is no organ which is more entirely trustworthy than

the heart, none which can more surely and safely be left to take care of itself, none which more firmly resents the fussy interference of the solicitous. Proper consideration for the heart means such a wholesome existence, animal and mental, as will enable it to pursue the even tenor of its way, unoppressed by poisoned blood and unburdened by incursions into its territory by its next door neighbour the stomach. Every student knows that the patient who complains of his heart is suffering in his stomach. The stomach balloons and encroaches upon the area which is legitimately occupied by the heart—a trespass which the latter very properly resents. Save only where rheumatic fever and its representatives in childhood are concerned, whose poisons have some very special selective action on the heart, it may be laid down as a rule that functional heart troubles arise directly or indirectly from dietetic enormities : directly, by overloading the stomach, causing physical embarrassment to the heart ; indirectly, by so overburdening the organs of metabolism that they are unable to void their excreta, thus imposing upon the heart an impure blood supply. The heart is the

most accommodating of organs: it will do anything you ask it; but you must ask it nicely, that is, with restraint and the sacrifice of your grosser greeds. But should you try to bluff it, it will bluff you one better. If you bellow your behests from a beer barrel or a baron of beef, through clouds of tobacco smoke, it will quickly show you who is master. "There is no evidence," says Professor Bainbridge in his recent admirable work on the *Physiology of Muscular Exercise*, "there is no evidence that, in a perfectly healthy man, even the most intense exertion produces any harmful effect upon the heart." If this is the case, then it is abundantly evident that there are very few perfectly healthy men about; also that the lack of such men is due to the unphysiological mode of life which the majority persist in pursuing.

Excretion

The daily round of animal existence may be said to begin with alimentation and end with excretion. I have already had a good deal to say on the subject of the former, and I shall return to it in more specific detail

later. Here I propose to consider excretion, the processes, that is, by which we are enabled to debarrass ourselves of the useless and poisonous products which we tend to accumulate as the result of feeding and tissue change.

We take into our systems a considerable quantity of material which, though quite harmless, is nevertheless quite useless from the point of view of repairing waste. Such a substance is vegetable fibre, which is by its nature insusceptible of being influenced by the digestive juices. When this fibre has been stripped of the useful material with which, in an ordinary vegetable, it is associated, the fibre itself is passed out along the intestines and is ultimately discharged. A very large proportion of the matter evacuated as fæces consists of material of this kind. It used at one time to be thought that fæces were composed wholly of material which was not susceptible of digestion, and there is little doubt that, in a perfectly balanced scheme of intake and output, this would still be true. Unfortunately, however, our present scheme of living represents the reverse of a perfect balance; the dice are loaded in favour of the intake, so that

Nature wisely utilises the intestinal tract as a means of expelling a great many substances other than vegetable fibre and its equally harmless congeners. And most of these other substances are not only highly toxic, but are toxic in the very special and disastrous sense of paralysing the tract through which they pass. Some of the extraneous material which finds its way into the bowel does not paralyse the tract: it irritates it, and diarrhœa with colic is the result. Such an event, unpleasant though it be, is a storm which soon wears itself out, and no ultimate harm ensues. With the paralysing toxins, however, the case is very different. They derive from the organism, and the organism is not intolerant of them. They produce a partial paralysis of the bowel, thereby not only protecting themselves against discharge, but actually ensuring their reabsorption into the circulation. Such is the real secret of constipation and the explanation of its terrible results—partial paralysis of intestinal activity, reabsorption of deadly poisons into the circulation.

I am well acquainted with the "kink and band" theory of chronic intestinal stasis,

of which I am a convinced upholder. The theory is quite correct so far as it goes, but inasmuch as it offers no adequate explanation of the causes which lead to overloading and consequent kinking, it must, by so much, be regarded as unsatisfactory.

There is another and a very important factor which enters into the production of the original overloading, and that is the voluntary control exercised by the individual. The education of this control constitutes a very necessary part of the upbringing of the child; in obedience to social and scholastic demands, it is gradually strengthened in the growing period, so that when adult age is reached, the control has acquired such an ascendancy over the original physiological desire for relief that the latter is scarcely appreciated, save only at certain hours, and then but feebly. Civilised man spends one-half his life in cultivating constipation and the other half in campaigning against it. Unfortunately, he resorts to the wrong weapons.

These two elements, the excess of voluntary control and the paralysing effect of the toxins on the movements of the intestines, combine to produce the most serious

effects upon the constitution. The retention or inadequate discharge of fæcal matter leads to reabsorption of poisons of every description, with the inevitable result that the human soil becomes so richly manured that any and every microbe settles thereon and flourishes exceedingly. And, apart from frank and blatant microbic invasion, one has to remember the gross impurity of the circulating blood to which such a state of matters gives rise. We have seen that for the efficient performance of its functions, every part of the body is dependent upon a pure blood supply. If the circulating fluid is loaded with toxins, as in chronic constipation it invariably is, then not only does the whole machine work badly, but certain parts of it, the most delicate, become perverted in their action. It is within the experience of most adults that inaction of the bowels, be it relative only, will depress the nervous system, giving rise to a lugubrious and pessimistic outlook on life, which, on the necessary alvine relief being obtained, is changed at once to animation and optimism. The hypochondriac, the kill-joy and the croaker are all of them constipated.

It is sometimes said that purgatives and

laxatives constitute a bad habit, which, like other bad habits, should be resisted. Such a view argues a curious lack of perspective. If it be true—and the proposition is at least a debateable one—that purgatives are physiologically objectionable, it is true to a far finer degree of truth that there is nothing which is physiologically so objectionable as the evils which chronic intestinal stasis brings in its corrupt and unclean train. In comparison with the coarse crime of constipation, a pill is a peccadillo. Moreover, the only means by which purgatives can be physiologically resisted is by rendering them unnecessary, and the only way of doing this effectually is by dietetic means. The poisons which are paralysing the intestines must be stopped at their source, which is the trencher. The poisons are produced by a plodding perseverance in surfeit of unsuitable foods, and until this practice is replaced by one of moderation in foods which are suitable, the stasis will continue, in spite of abdominal belts, abdominal operations, and abdominal lubricants.

Besides man, the only constipated animal is the domestic dog; and he is constipated by exactly the same causes as those which

determine constipation in man. For purposes of cleanliness he is taught to control his desire for evacuation; and he is given food "the same as we 'as ourselves," which paralyses his intestinal activities. Of the two, however, the dog is in the better case; for he knows when to fast, whereas man does not.

There are more constipated people in the world than know themselves to be constipated: there are hundreds who live in the Fools' Paradise of a very partially emptied bowel. Most people eat at least three meals a day, but even the most enlightened amongst them do not relieve their bowels more than once a day. Physiologically and logically, each meal should be followed by an action: the excrement should make room for the increment. That this should not occur would matter less than it does, if the daily action were really sufficient to rid the system of all the waste material which is stored in the lower reaches of the intestine. Unfortunately people are brought up to such mean and ignoble standards in these matters that when they actually do succeed in emptying themselves, they are so surprised and shocked that they betake them to the chemist to be

cured of the diarrhœa from which they believe themselves to be suffering. The habitually constipated person is sad. He is sad in spirit and sad to look upon. Carlyle said that whenever he met a perfectly healthy looking man in the street he felt inclined to take off his hat to him. However things might have been in his time, it is certain that were the philosopher to return to life, he might to-day safely walk the streets of London for a week without once being moved to uncover his head. The muddy complexions, the oily skins, the congested ears, and the malodorous emanations, are but a few of the stigmata which proclaim the hidden cesspool to those who know. And those who consent to display these horrors will complain to the doctor that they are martyrs to constipation—for they love to talk about it. The drunkard might with equal justice claim to be a martyr to delirium tremens. The cure for constipation is to eat wisely and not too well; a simple prescription which is easily within every one's reach.

The mean and ignoble standards of evacuation with which people nowadays are stupidly satisfied are due in a large measure

to the household sanitarian. These unimaginative worthies construct the standard water-closet in such a form as to render it impossible for the householder to gauge the sufficiency or otherwise of his morning tribute to the goddess Cloacina. This is a very much graver matter than it might superficially seem to be. In a person whose control has been carefully educated, the act of defæcation is so performed as to give little or no information as to the quantity voided, and if that quantity immediately disappears from view, as in the standard water-closet it does, he is unable to correct his fallacious sensations by calling in the aid of his vision. An insufficient evacuation is liable to go uncorrected, and disastrous accumulation results. Moreover, though hypocritically concealed, save among young men in the intimacy of college life, it is a well-known fact that the ocular demonstration of a really generous evacuation produces a most uplifting effect; a simple pleasure in a joyless world which should in no wise and by no means be denied to anyone. The household sanitarian should study psychology. He should likewise study physiology.

If the sanitarian were to study physiology,

he would quickly realise that the ordinary water-closet is much too high off the ground. The crouching position in which man normally and physiologically performs the act of defæcation, enables him to employ his expulsive muscles to their full power. When he is seated on the throne of the domestic water-closet as usually constructed, these muscles are necessarily and mechanically out of action, so that he is unable to call them to his expulsive aid. The result of this is liable to be either no action at all, or one which only partially empties the bowel. Until a generation of sanitary engineers arise which is prepared to meet this very real and very pertinent objection to the form now in use, the householder must counteract the difficulty as best he can. This he can do, by placing a chair in the water-closet, on to the lower rail, or upper, of which he should place both feet, in such a manner that when he is seated on the throne his attitude approximates to that which he would naturally adopt in the open country.

The food which is taken into the body and utilised, replaces material which is worn out, and is consequently not only useless

but poisonous. This material, the end-result of tissue change, is voided as urine, by the kidneys, viâ its reservoir, the bladder. The duties with which the kidneys are charged are extremely important. If these organs altogether fail to perform their excretory task, lethal poisons collect in the system, and death is the rapid and inevitable outcome; and even when the failure is but partial, the results are highly dangerous to life. Roughly speaking, the kidneys may be regarded as filters which, while allowing effete matters and other poisons to pass through, ensure the retention of valuable material. Normally, their selective capacity is very keen. They are quick to void undesirable matters and comparatively leisurely in discharging those which, though useless, are harmless. They are very sensitive to various influences, and are called in aid when any of the other excretory organs fail adequately to perform their respective tasks. Thus, they are much more active in cold weather when the loss of water by the skin is reduced. Their activities are very much increased when the bowels are constipated and when the intestinal glands are lazy in the performance of

their antiseptic responsibilities, when, that is, poisons tend to accumulate in the system. Like the bowels, they respond at once to poisons introduced from without, which they do their best to get rid of as soon as possible. Nervous influences of various kinds will produce a very large, in some cases an enormous, outflow of urine. Diseases, such as diabetes and some affections of the kidneys themselves, are accompanied by an increased output. In view of these facts it should be recognised that there is a condition which may properly be described as renal diarrhœa, of which people would do well to take cognisance; not, however, as an offence to be corrected, but as a warning to be heeded. The kidneys, in common with the rest of the organism, endeavour to rest during the night season. If instead of remaining unobstrusive from bedtime to calling time, they are sufficiently active to force the victim from his bed even once a night, and make a practice of so doing, then the matter requires investigation. Some articles of ordinary food or drink are liable to produce end-results which irritate these delicate organs, and in the absence of any obvious cause for a renal

diarrhœa such substances should be sought for and rigidly excluded from the schedule. As people have curious idiosyncrasies in this respect, it is quite impossible to lay down any rule, but it may be said that such apparently harmless substances as tea, coffee, and some wines, especially champagne, act in this way on many seemingly healthy people.

Presumably because it is painless and occasions comparatively little inconvenience, less notice is taken of renal diarrhœa than its importance deserves. The kidneys are very delicate structures, and if they are constantly being irritated, their mechanism will soon show signs of undue wear and tear, and with structurally damaged kidneys a person's expectation of life is poor. Nature is never capricious : she acts with a purpose, and if we were more honest, diligent and intelligent in seeking to interpret her activities, we should save ourselves much preventible ill-health. It is said that a man is either a fool or a physician at forty. He is much more often a fool than he is a physician, for by the time he is forty, he has usually allowed greed and self-indulgence to stereotype his inherited vices into

a fetish, which he worships with grim and patient pertinacity. The ordinary man goes on doing the things that he has always done, partly because he knows no better, but chiefly because he wants to know no better. He persists in ways which the application of the smallest intelligence would persuade him were stupid and unphysiological ways. When matters come to a crisis he applies to a doctor, or more often to a quack, with an insistent demand for a "lightning" cure of evils which it has taken many years to bring to their full fruition. The preference for the quack is characteristically stupid. It rests on the fact that he immediately proceeds to peddle you an earthly Paradise from an ass's pannier instead, as the doctor does, of pointing an hortatory finger to the straight and narrow way to a godly, righteous, and sober life. There is no "royal road" to health.

The value of the skin as an excretory organ is seldom appreciated as it ought to be. If we were to be guided in this matter by pure scientists, who, it may be said, have contributed nothing to our knowledge of the subject for at least forty years, we should be content to place the skin

very low in the scale of depurative organs. Practical experience, however, teaches us that this large surface, more or less exposed to the air, is capable of doing a vast amount of excretory work which cannot well be performed elsewhere. And as in the case of the other excretory organs, it does its work by the medium of water. Apart altogether from the sensible perspiration, to be considered immediately, we have to remember that watery vapour in an insensible form is exhaled from the surface of the skin just as it is exhaled from the lungs. It is, in fact, evaporated, and the main purpose of this evaporation would seem to be the regulation of the heat of the body. Inasmuch as the normal temperature is round about 98·4°F. and the outside temperature between 65° and 70°F., or even less, it is obvious that this evaporation must be very considerable. When, from over-consumption of foods or otherwise, the internal temperature is raised above the normal, the evaporation is even more pronounced. Now, it is not only watery vapour which is thus given off. The pure scientists tell us, it is true, that the matters dissolved therein are negligible, but in actual

practice we have little difficulty in persuading ourselves that gaseous emanations, sometimes of a very pungent kind, habitually accompany the watery vapour, and there can be no reasonable doubt that these emanations are of such a nature as to render their discharge in the highest degree both physiologically necessary and artistically desirable.

When sensible perspiration occurs, the fluid comes not only from the surface of the body as before, but additionally from the mouths of the sweat glands which are so liberally distributed over the surface, with a very special concentration in certain situations, as the armpits, the palms of the hands and soles of the feet. The pure scientists tell us that the fluid thus discharged is almost pure water, the very meagre solid contents consisting chiefly of common salt, but they admit that a certain quantity of carbonic acid gas is given off at the same time. Parenthetically, it seems pertinent to ask, "And if carbonic acid, why not other gases?" There are poisons among gases no less than among fluids. The oily material present in sensible perspiration comes from another set of glands called sebaceous glands,

which are closely related to the nutrition of the hair.

There is a great deal of clinical and personal testimony to the fact that a profuse perspiration affords a general sense of great relief. We can therefore refer the pure scientists to their studies and their laboratories, with the request that they will furnish us with a scientific explanation of an undoubted fact. That the complicated mechanism of blood-vessels and glands of two different kinds in so large a surface as the skin is designed simply and solely to evaporate water for purposes of heat regulation, is a proposition which cannot appeal to him who has experienced the benefits of a Turkish or even of an ordinary hot bath. And it is to be remembered that sweating which is induced by muscular exercise is admittedly of more depurative value than the sweating induced by the mere application of external heat. Another fact which, though unexplained, brooks no denial, is that heat plus light is more active in ridding the system of impurities than heat alone; and that when, as in summer outdoor exercise, muscular work can be combined with sunlight, the maximum advan-

tage is to be expected from the perspiration thus induced.

Sweating then must be regarded as one of the normal physiological methods of excreting waste products from the system, and should be cultivated as a very easily attainable means to the maintenance of health. Inasmuch as the water discharged by this route is liable to be considerable, care should be taken to replace it by drinking a sufficient quantity of fluid, otherwise the bowels and kidneys may find themselves deprived of the vehicle essential for their activities. That the skin may be induced to undertake a considerable portion of the excretory work of the kidneys is well known to doctors, who are in the habit of prescribing sweating processes to patients suffering from insufficiency of the kidneys, as in certain forms of Bright's disease. That the skin may, and frequently does, perform some of the work of the inactive bowel is all too frequently and unpleasantly forced upon the consciousness even of the most unobservant, by the fœtid fæcal odour which emanates from the skins of the miserable, meat-eating people who meekly allow themselves to be continually constipated.

The air which we inhale is dry. Its dryness depends upon climatic humidity, which varies between say 65 in a dry climate, such as that of Egypt, and 82 in a humid climate such as that of the south-west coast of England. The air which we exhale is entirely saturated with moisture, representing in relation to the above figures, the maximum of 100. It follows that the greatest amount of water which can be removed from the body by this route will escape during muscular exercise in an atmosphere which is cold and dry. That is the reason why keen, dry air is felt to be invigorating: it invites to muscular exercise. Thus, the lungs excrete water: they also excrete carbonic acid gas. This last is a poison which is manufactured in the tissues, and is voided in order to be replaced by oxygen, which is essential to the tissues. The exchange of carbonic acid for oxygen which takes place in the lungs has already been referred to —old lamps for new—and certainly constitutes by far the most important function of these two large organs. The system is relatively tolerant of carbonic acid, deadly poison though it be. It is especially tolerant when the poison is imposed upon it by

degrees, as, for instance, in crowded assemblies, where it accumulates in the atmosphere bit by bit. If we take 10 as a high percentage of carbonic acid for inspired air—which it is—it is surprising to find that animals can easily support a percentage of 12, or even 16, provided always that this amount has been reached gradually; but should such an animal be placed suddenly in an atmosphere containing that amount, it immediately dies of suffocation. This explains how it is that people entering a stuffy room from outside, immediately complain of the stuffiness, whereas those whose exhalations have contributed to the stuffiness are in blissful ignorance that it is stuffy, and more often than not resent the suggestion of stuffiness.

The above experiment refers to pure carbonic acid gas, uncontaminated with the organic vapours which are to be found in air exhaled from ordinary human lungs. The addition of such contamination naturally renders the air containing the carbonic acid even more poisonous, and although it be true, as authoritatively contended, that apart from its carbonic acid content, the expired air of a perfectly normal person is

not toxic, experience would suggest that in this matter there must be very few perfectly normal persons. It is well within the knowledge of every one that the aroma of alcoholic drinks is exhaled by the lungs, and every doctor and every nurse knows that certain diseases are accompanied by an odour of the breath which is perfectly characteristic. We are therefore forced to the conclusion that in addition to water and carbonic acid, the lungs are charged, exceptionally perhaps, but still charged, with the duty of excreting certain other substances of a deleterious nature; that they are, in fact, supplementary excretory organs with a very wide range of activity. That the lungs endeavour with some success to come to the rescue of the other excretory organs in such diseases as diabetes and uraemia is well known; that they do so less obviously in other conditions must be quite obvious to any impartial observer. That there are such things, for example, as gouty bronchitis and gouty asthma, is freely admitted, but it is not always realised that their occurrence is due to an effort on the part of the bronchial tubes to aid in the expulsion of the gouty poisons.

There are indeed many whose opinions are eminently entitled to respect who hold that bronchitis is always due to a weakening of the bronchial soil by the ceaseless endeavour of gouty and similar poisons to force an exit by this route. That this view is in the main correct there can be little doubt, and if it is correct, it means that the way to avoid bronchitis is not by the stereotyped methods of feeding up to "keep up the strength," and coddling up to keep out the cold, but by such a restricted dietetic regime and general depuration of the system as will remove the illegitimate excretory strain from the bronchial tubes and allow them to concentrate upon their legitimate work. The same is true of gouty asthma.

The lungs then must be regarded as supplementary excretory organs; but the system does not call upon them until it is in sore straits. When it is evident that they have been called up, and are operating in the front line, the proper course to adopt is to check the necessity for supplementary excretion by suitable general measures and by stimulating the activities of the ordinary excretory organs. The occasion is not one

for poultices, linctuses and bronchitis kettles; rather does it suggest old-fashioned aids to salvation such as black draughts, sweating, fasting and blood-letting. The nice old gentleman with a "nasty cough" and Aunt Matilda who is "a martyr to the bronchitis" deserve, not pity, but a purgative. It is of course true that irritants reach the bronchial tubes from without, especially in large cities, but the most frequent and irritating irritants come from within, and they do their irritating in trying to find an exit.

Although its occurrence has but a slight connection, if any, with the excretory function of the lungs, this would seem to be a fitting place to say a word concerning a matter which, in these days of aeroplanes, is becoming one of increasing importance, namely so-called "mountain sickness." This prostrating condition is believed to be due to the relative lack of oxygen and air pressure which obtain at high altitudes. It has long been known to overtake untrained alpinists and those who ascend rapidly from the plains to considerable elevations. Its most obvious symptom is vomiting, which is usually accompanied by a violent head-

ache, restlessness, irritability and loss of restraint. It is not in itself dangerous, but when it happens to a passenger in an aeroplane, as it often does, it may occasion considerable alarm and much inconvenience to the other passengers. Among the mountains it is less likely to occur to those on foot than those who travel by train or funicular. The more sudden the rise and the greater the altitude, the greater the likelihood of its happening. Those who have once suffered in this way should be careful not to expose themselves to similar conditions again.

Nutrition

The French have a saying to the effect that air constitutes one-half of our nourishment. The phrase, exaggeration though it be, expresses a truth of which we are all too liable to lose sight. In the absence of fresh air, our food seems to nourish us but partially; we do no credit to our victuals, as the saying is. The same is true of light. Fresh air and plenty of daylight are both essential to the process of nutrition, the burden of which is borne

by the alimentary tract. In the absence of these two coadjutors, food will fail to do its work of repair, however wisely it may be chosen and however carefully chewed. But, curious as it may at first sight seem, the most important factor in nutrition is sleep. Without sleep, the ingested material, however well it may have been digested, is unable to reach its intended destination. This is a matter which will be fully explained later (see page 190).

As soon as food is put into the mouth it is intended to be broken up into small particles that it may the better submit itself to the action of the saliva, which is a digestive juice of considerable importance. The process of mastication is slurred over by the majority of people. They seem to act as though the main object in eating was to get the food into the stomach as quickly as possible. This is of course, altogether incorrect, not only because bolted food means food unready for the stomach to digest, but because the acts of mastication and frequent swallowing entail the use of certain muscles whose adequate exercise is very essential to the well being of the structures about the face and neck.

This, though true of every one, is most especially applicable to children and young adults. The practice of giving children foods which require no mastication, that is, soft and pappy foods, cannot be too strongly condemned. Food thus given not only escapes admixture with saliva which contains important digestive principles, but it relieves the child of the necessity for working its jaws and muscles, with the result that the bones about the face, especially those of the lower jaw, are inadequately developed. The inevitable consequence of this is that there is barely sufficient room for the teeth to come through, leading to overcrowding and subsequent early decay. Moreover, the under development of the lower jaw is ugly. In men it gives the impression of imbecility; in women, it is liable to detract very seriously from what might otherwise be a pleasing appearance. Further, it is asserted by some very acute observers that the absence of necessity for sufficient mastication is of itself provocative of adenoids, enlarged tonsils and swollen glands. However that may be, it is quite certain that Nature intended the muscles of mastication to be well and truly used during

the growing period, in order that the bones in their neighbourhood, amongst which must be counted those which support the brain, may arrive at their proper development. If they do not so arrive, very severe penalties both metabolic and artistic are payable in later years. Even in the case of adults who have attained to full development in these respects, the necessity for vigorous mastication still remains. Like every other organ in the body, to ensure their health, teeth must work. The dance of the teeth in their sockets, small as its amount is, and little as it may be appreciated by most people, is a most important element in their continued well being. Not only does it ward off decay, but it protects the gums against pyorrhœa and the facial nerves against neuralgia.

It is said that each mouthful of food should be masticated thirty-two times—once, for each tooth. This is regarded as sufficient by most people, though it is right to add that, following the teaching of Luigi Cornaro, a certain school of physicians advocate that each mouthful should be chewed until it is perfectly fluid and completely tasteless. This drastic reduction of foodstuffs into

their elementals may be very valuable in some ways, but as the process is a slow and laborious one, which takes up a great deal of time, and renders conversation at meals a physical impossibility, it is not likely to commend itself to many people. The classical thirty-two times should suffice for most people, and once a person takes to counting the number of times, he is usually astonished to find that he has been in the habit unconsciously of getting very near this total, and that a very little practice will habituate him completely thereto.

When food is swallowed, it passes out of the mouth into the gullet, through which it is propelled rapidly into the stomach. In relation to the rest of the abdomen, the stomach is a small organ. It is situated immediately below the heart from which it is separated by the diaphragm only. When the stomach is distended it pushes the diaphragm upwards, causing the latter to encroach upon the territory which properly belongs to the heart. This act of trespass is always resented by the heart, which protests its indignation by palpitations and breathlessness. Gaseous distension of the stomach, which is usually the

result of indigestion, invariably gives rise to unpleasant sensations in the heart's area, because the force of gas is upwards. When the stomach is distended by solids or fluids, as it usually is after a typical British meal, the encroachment proceeds downwards. This is due to the weight of the distending material—roast beef and Yorkshire pudding weigh a great deal—and the area encroached upon is that which properly belongs to the intestines, especially the large intestine, which in their turn are forced downwards.

The stomach is normally a very accommodating organ. It will make room for almost any extravagant cargo which may be shovelled into it, and then proceeds to debarrass itself thereof as quickly as possible, to resume its normal dimensions as speedily as it may. Unfortunately this act of resuming its normal calibre gives rise to sensations which are indistinguishable from those of hunger, so that its possessor immediately proceeds to shovel in an additional load, long before the first one has been disposed of. Then ensues a further distension, and so *da capo*. This constantly repeated distension of what is intended by Nature to be a hollow organ eventually

gives rise to permanent dilatation, in precisely the same way that a boot-tree stretches a boot—and keeps it stretched. The stomach thus treated loses its recoil: it becomes a large flabby partially filled, bladder-like mass, occupying the greater portion of the abdomen, the other organs in which, especially the large and small intestines, it pushes downwards and dislocates. A stomach which is never allowed to empty itself and contract into its proper place, gives rise to pot-belly, which forsooth is regarded as so normal and dignified an accompaniment of middle age as to elicit compliments from tailors and dressmakers. More than any other part of the body, the stomach requires time in which to accomplish its work, which, having accomplished, it is entitled to rest. But under ordinary circumstances no rest is ever allowed to it. So it becomes stretched and pendulous. It is estimated that it takes the stomach at least five hours completely to dispose of an ordinary mid-day meal. How often is it allowed as many as three hours?

Under normal circumstances, the food on reaching the stomach is subjected to a process resembling churning in order that

it may be reduced to a fluid state and thus rendered capable of being acted upon by the digestive agencies. The chief of these are of course pepsin and hydrochloric acid, but there is a third to which a sufficient amount of attention is not usually directed. There are a great many bacteria in the stomach and intestines, and some of these take a very active and beneficent part in reducing the food to such a condition as to render its assimilation rapid and easy. The practice of sterilising children's food and cooking the food of adults, with a view of getting rid of microbes is therefore in direct opposition to one of Nature's most obvious expedients; for if the bacteria which aid in the digestive process were not occasionally reinforced from without, they would lose most of their activities. Fortunately, however, the puny devices of man must always be unsuccessful when placed in opposition to Nature's intentions, and no amount of boiling or cooking can completely exclude from our stomachs the friendly bacteria which are so essential to our well being. The enemy bacteria who may be supposed to find an entrance along with the friendly, do not matter;

they are killed as soon as they arrive.

It is not my purpose to follow the food through the various digestive processes and activities by which the suitable portions are converted and absorbed into the system and the useless portions rejected, along its passage through the intestines. It must suffice to say that on leaving the stomach, the food is brought into contact with digestive fluids from the pancreas and the liver and that in its passage along the small intestine, various other influences are brought to bear upon it. When it arrives at the junction between small intestine and the large (also called the colon) it is still in a fluid state. During its passage along the large intestine the still remaining usable matter is absorbed, with the result that the useless material is discharged from the rectum in a solid or semi-solid form. Throughout its long passage from stomach to the outside world, the food mass is thus undergoing a series of processes of modification, permitting the absorption and assimilation of its suitable contents together with rejection and passage onwards of its unsuitable contents. The suitable contents ultimately find their way into the blood,

by which they are distributed to the various appropriate organs, much as a postman delivers letters in a town to the persons to whom they are addressed.

The unsuitable material, when concentrated and collected in the large intestine, is called the fæces. We have seen that the large intestine absorbs fluid nourishment. Unfortunately it has no discriminating power, and on occasion it absorbs material which is the reverse of nourishing. An ordinary meal takes about twenty-four hours to pass from the stomach to the outside world. That is an average which, in response to influences of various kinds, is liable to be very much modified in either direction. It is an average which is by no means the same as the normal. To judge by the lower animals, the normal would seem to be very much more rapid; to judge by the majority of human beings, the normal would seem to be much less rapid. Having regard to the fact that the large intestine is a very absorbent organ, and that the matters usually therein contained are highly poisonous, it is probable that the contents should be ejected three times daily, once after each meal. The

customs even of careful people are much more moderate than this, amounting to seldom more than once a day. This ought in reality to be sufficient, with two important provisos. The first is that the material which is thus allowed to remain in the bowel for twenty-four hours is not of a putrefactive nature; the other is that the daily evacuation is really adequate in quantity. A very large number of people who go regularly to stool once a day, void a quantity which, though satisfying to themselves, is from a physiological standpoint fantastically insufficient. They relieve not the whole of the large intestine, but merely a third thereof, leaving the poisons from the remaining two-thirds to be reabsorbed.

Nor does this reabsorption constitute the whole of the damage. We have seen in the case of the stomach that the effects of continual overloading are distension of the organ and its dislocation downwards. The same holds good in the case of the large intestine. When the contents of this tube are but partially evacuated, the matter which remains behind, distends the lumen of the tube and converts it into a miniature lake; a cesspool in fact. The weight of

the cesspool is considerable, and it dislocates the whole tube downwards as far as it will go. Now the large intestine has a course roughly resembling the three sides of a quadrilateral. It begins low down on the right side of the abdomen and ascends against gravity until it reaches the lower ribs on the right side, where, taking an almost rectangular turn, it passes across the front of the abdomen to the lower ribs on the left side. Here it takes another almost right-angled turn, and then passes down to finish its course at the anus. At the two reactangular corners, the large intestine is anchored in such a manner as to prevent its dislocation at these two points. The cesspool therefore collects between these two points and transforms what should be a straight tube into a festoon with a bulge at its lowest point. The weight of this fæcal festoon pulls upon the two fixed points, with the result that, at these two fixed points, the tube becomes kinked, just as an indiarubber tube becomes kinked when stretched over a nail in the wall. This dislocation entirely alters and seriously deforms the original course of the large intestine. In place of two

right angles joined by a straight line, there are two very acute angles joined by a festoon. It does not require any special training in mechanics to realise that such a deformation must seriously interfere with the efficiency of the large intestine as an effluent. Retention of fæcal matter gives rise to distention and dislocation, which in its turn, leads to further retention—a vicious circle than which there is none more lethal.

It has been pointed out that the large intestine knows no discrimination; it is seemingly incapable of distinguishing between material which is desirable and that which is undesirable; it accords a generous hospitality to everything which presents itself at its portals. That is indeed a pity, because the material which resides in the cesspool is liable in most people to be deadly in a very high degree. I say most people, because the remark does not apply to everyone. Some people—the majority—eat foods the fæcal residue of which is putrefactive, while others do not eat such foods, a matter which I shall immediately proceed to discuss.

Until quite recently we were taught that

the value of food for human consumption could be estimated according to certain "proximate principles" as they are called, and that it was these and these alone which mattered. We know better now. The proximate principles were: proteids, as represented by eggs and meat; carbohydrates, as represented by starches (rice and potatoes) and sugar; fats, as represented by butter and vegetable oils; and mineral salts which are present in certain vegetables and fruits. Most foods contain all these proximate principles in certain proportions, the one food which was considered to contain them in what may be called an ideal proportion was milk. The various proximate principles were decorated with the exclusive possession of certain virtues. Thus, the proteids were tissue formers, the carbohydrates were energy liberators, fats were heat producers—a series of rather imaginative assumptions which failed conspicuously to afford any satisfactory explanation of dietetic problems. Then came the fantastic calorie theory, which was based on the supposition that food could be made to behave in a test-tube in precisely the same manner as it

behaved in the human body. I mention these theories merely to warn people against them. They were formulated in ignorance of the accessory food factors or vitamines, whose discovery has placed the whole theory and practice of dietetics back into the crucible. Vitamines we know to be essential to the growth and development of the young and the maintenance of health in the adult. They are very subtle and elusive substances, very difficult of isolation. So far, four of them have been isolated, but inasmuch as they appear to be as necessary the one to the other, as the whole group is to the economy, no good purpose would here be served by entering into such detail as our present knowledge affords. We shall hear a great deal more about the individual members of the group as investigation progresses; for the moment, we must be content to consider them *en masse*.

Speaking generally it may be said that vitamines are present in raw foods and are absent from cooked foods. This is not strictly accurate, because certain foods, even when cooked, manage to retain their vitamines—relatively at any rate. It seems

to be the case that a short exposure to considerable heat is not nearly so destructive to vitamines as a long exposure to moderate heat. A rapidly poached egg, for example, will retain most of its vitamines, whereas, a hard-boiled egg will retain them in a much less degree—if at all. Vitamines seem to favour the outside coverings of certain foods. Thus, they are present in unmilled rice, but absent from rice which has been milled. They are present in brown bread, but absent from white bread. Unpeeled potatoes are much richer in vitamines than peeled potatoes. There is something essentially vital in vitamines. They are never present in anything which is dead, or in anything the vitality of which is in abeyance. They are, for example, absent from dried peas, beans and lentils. But if these be soaked in water and placed on a blanket and exposed to the air, they will germinate, and immediately become possessed of vitamines.

There has been an unfortunate tendency on the part of experimentalists to try and gauge how small an amount of vitamines will suffice to protect people from certain classical diseases known to be associated

with the complete absence of these substances from food. These diseases are known as Deficiency Diseases, and they include scurvy, some forms of rickets, neuritis and others, all of which have outstanding symptoms. Such symptoms, however, take a long time to develop, so that the absence of vitamines from the food will have been undermining the health of the patient for a long time before the disease is declared. To estimate the minimum amount of necessary vitamine in the ingested food is equivalent to estimating the minimum amount of necessary oxygen in the inspired air. In both cases we require not the mimimum but the maximum.

The various creatures in the evolutionary tree which has its apex in the emergence of the genus homo, found in their environment the wherewithal to nourish themselves. When we arrive at the higher vertebrates that wherewithal is represented partly by vegetable and partly by animal food. Man's nearest relatives, the apes, are mixed feeders, and it was on this mixed diet that man's immediate ancestors succeeded in raising themselves from the level of the brute creation to what they have since

gradually become. Man not only survived and continued to exist, but he continued to progress. It was during this period that he assumed the erect posture which has been a powerful factor in conferring upon him much of the superiority which he enjoys over the lower animals. It is worthy of note, in passing, that the human child does not become erect until his brain is fully developed.

During this period man lived on food which, whatever else it was, was raw. At what period in his upward progress he took to cooking his food, cannot now be even conjectured, but it is almost certain that he cooked his flesh foods first, and that it was not for a very long period thereafter that he began to cook his vegetables and fruits. Vegetables did not indeed exist until man became an agricultural animal, which was a very long period after he became erect.

We must look upon the successive stages as having followed each other roughly as follows. On assuming the upright posture, man took to hunting small animals, which he ate raw. At the same time he continued to eat fruits and roots and herbs which his

ancestors had eaten ; these, too, he ate raw. Presumably by some accident he discovered that flesh which has been in proximity to a fire acquired some gustatory virtues which were less conspicuous in raw flesh ; he therefore took to cooking his flesh foods. We may assume that this primeval cooking was of a very partial kind, in the sense that it was the outside portions only of the meat which were exposed to the fire, the inside portions remaining raw, and thus retaining their vitamines. At this period man was still eating his fruits and roots and herbs in their raw state, and this he continued to do up to comparatively recent times. Agricultural produce was probably never cooked until well into the period of our present civilisation, and then for a very long period, it was eaten raw by the vast majority. Cooked foods were a luxury restricted to the few.

This brings us face to face with the unquestionable fact that the rise of the genus homo sapiens to his position as lord of creation has been accomplished on raw foods, that is on vitamines. Wherever and whenever he has degenerated, he has done so to the accompaniment of an ever lessening quantity

of these essential factors in his dietary until he has now arrived at the point of altogether excluding them. Their exclusion began, as we have seen, in obedience to his gustatory preferences, and was continued on the same lines. Within the memory of many still living, the comparative became rather suddenly transformed into the superlative by the germ theory of disease. This theory, and the practice which was its logical outcome, ordained that food should be boiled and sterilised against the microbe, so that we have now arrived at the point where it is taken for granted that all our food, from the cradle to the grave, ought to be, must be, and shall be cooked. The result of this has been to bring the grave much nearer to the cradle.

The vast majority of the diseases from which people nowadays suffer are either directly or indirectly "deficiency diseases," diseases that is which are due to a lack of vitamines in the dietary. A gross deficiency in these essential elements has now been accepted as the cause of certain well defined diseases, but it is not yet recognised as widely as it ought to be, that a deficiency which, though short of being complete or

gross, may nevertheless be sufficient to cause a gradual decline in the powers of resistance of an individual, thus rendering him an easy prey to maleficent microbes and metabolic disorders. Hundreds of thousands of pounds are annually being spent upon research into the causes of cancer. If some of the researchers would descend from their laboratories and visit the basement they would find at least one of the causes glowing in the kitchener and another hissing on the hob.

"Would you then," I may be asked, "would you then suggest that all food should be eaten in its raw state?" To which I would reply that it is quite obvious that Nature intended us to eat our food in its raw state, otherwise she would not have ordained that culinary processes should deprive our food of its vitamines. There is no essential harm in cooked foods so long as they are placed in their proper perspective. They are now firmly and even fiercely regarded as necessaries, whereas they are in reality but luxuries, and very insidious luxuries they are. Raw foods, namely dairy produce, uncooked vegetables and uncooked fruits, are the real essentials, and,

contrary to what is usually believed, are more than all-sufficient to supply the economy with its physiological needs. Cooked foods belong to the same category as alcoholic drinks and tobacco, which are luxuries whose occasional use in reasonable quantities may be permitted to the weaker brethren. But, in common with alcohol and tobacco, cooked foods do no good; the best you can demand of them is that they shall do you no harm. The dangers and disasters of alcohol and tobacco have been proclaimed from the housetops, to the great advantage of the health of the community, but the equal dangers and the greater disasters—greater because they are sly and subtle—of cooked and devitalised foods remain unrecognised and uncondemned.

In the beginning God made man upright, but they have sought out many inventions. Among these many, two stand out as the most deadly, namely the closed window and the cooking-stove. Than these two, even the spirit-still is less lethal.

It is of course true that cooked foods manage to retain some of their vitamines. Had they not been able so to do, this civilisation would long since have passed

away. But every advance, every refinement of the culinary art renders their retention more and more difficult. The proof is furnished by the fact that in spite of our admirably administered public sanitation, in spite of our cultivation of outdoors sports, in spite, too, of our ever increasing moderation in the matter of alcohol, at the outbreak of the Great War we were found to be a C.3. nation. And it is quite certain that unless we abjure our faith in burnt offerings and turn our faces to the light of clean and simple living, we shall continue still further to degenerate.

One of the greatest obstacles in the path of dietetic reformation is the unshakable conviction in the necessity for flesh foods. People will consent to eat salads in place of devitalised vegetables, and may be induced to replace puddings and sweets with fresh fruits, but any suggestion that flesh foods should be forsaken and forgone is so surprising as at once to raise doubts as to the sanity of the interlocutor. This is not perhaps surprising when we remember that in this country it is the custom for sedentary livers to consume meat foods at least three times daily, as a solemn rite, fundamentally

necessary to salvation both of body and soul. The proper attitude towards meat foods is comprised in the aphorism that he, and he only, who hunts his game is entitled to eat it. He who does not hunt his game, or do the equivalent in really vigorous exercise, is not entitled to eat it. And in reality, even he who eats it legitimately, ought strictly speaking to eat it raw, or, at any rate, saignant. This being so, it is much wiser and cleaner to remove such foods altogether from the list, except as very occasional indulgences. As a matter of experience, it is found that people who have once given them up, never wish to return to them: but they don't like giving them up. Such foods are very stimulating and the withdrawal of the stimulant is liable, at first, to bring disagreeable consequences. Like the drunkard and his dram, the meat-eater, when deprived of his meat, is ready with forty thousand reasons why, it should be restored to him. He says he feels weak without it; and he undoubtedly does—at first. He assures you that it does him good; so it does—at the moment. And being stimulating, meat foods invite to excess. "The appetite which comes with

eating," comes with the eating of meat foods alone. Try as he may, no man can overeat himself on such simple fare as dairy produce, fruits and salads. And gluttony, the super-sin of this dispensation, is not only one of the deadly sins: it is the deadliest.

All this assumes that meat foods, as now consumed, have been subjected to some culinary process, so that what is true of meat foods is in a measure true of all cooked foods. Cooked vegetables and puddings not only contain no vitamines, but they are cooked in such a manner as to ensure that they shall be stimulating. The highest compliment you can pay the cook is to lick the platter clean, and this you are unlikely to do unless he has so seasoned his dish that you finish it, not from need, but from greed. A healthy man is perfectly content with simple natural foods. If he should not be, the remedy obviously lies not in the stimulation of his appetite by highly seasoned dishes, but in creating an appetite by the simple expedient of fasting. It is agreed that "we all eat too much." One of the reasons for this sin from which we should pray to be delivered, is that we eat

when we are not hungry. Our meals are dictated not by the claims of hunger, but by the chimes of the clock. The man who finding it is one o'clock, sits wearily down to his luncheon sighing pathetically and wheezingly that he has no appetite, is immediately adjured to "try a little of this or that," and is watched sympathetically while he performs this feat of heroic self-abnegation. No one ever says to such a man that if he is not hungry, he is a fool if he eats; that, instead of grumbling at the unappetising dishes, he would be better employed in spending the luncheon hour on a bicycle or in a gymnasium. To eat whether you want to or not, merely because it is one o'clock, is one of the most fantastic acts of physiological folly that can well be imagined. And yet it is being perpetrated daily by thousands of people who are commonly regarded as sane and educated. The man who is not content with simple natural foods is not hungry; and if he is not hungry, he should not eat. Such is the law and the prophets.

The simple, natural, vitamine-containing foods are the promoters of good health in various directions. The most important of

these is the avoidance of that arch-enemy of mankind called chronic constipation. It has been proved beyond all possibility of cavil that it is the vitamine content in the ingested food which provides the motive force for propelling that food and its residue along the course of the intestines. With plenty of vitamines, the bowel empties itself automatically and generously: in their absence it empties itself grudgingly, if at all. No adventitious aids can take their place. Purgatives, laxatives, oils, belts, massage, are vain words and impotent measures if their *champ de bataille* be not watered by vitamines. And if it be so watered, these aids become wholly unnecessary save as occasional correctives of dietetic indulgences. The experienced in such matters can tell of countless cases of people who for thirty years and more, on an ordinary diet, had never dared to go to bed without a dose of cascara or its equivalent, in whom the substitution of a vitamine diet for the ordinary one had produced a complete transformation from faulty into healthy habits.

Sir Arbuthnot Lane and his disciples, who are daily increasing in number and authority, recognise in chronic constipation

or intestinal stasis the *causa causans* of most of the ills to which modern civilised flesh is heir. The truth of their contentions is now beyond a doubt, but it has been reserved for Professor Howland Hopkins, the apostle of vitamines in this country, to point the way to the avoidance and cure of this noisome and noxious condition. A sufficiency of vitamines in the food will not only prevent, but it will also cure chronic intestinal stasis. The man who lives on natural foods, uncooked dairy produce, salads and fruits, is practically never constipated, and even if he should be, he does not suffer the deadly and disgusting consequences which await the man who is constipated on an ordinary diet. And this is the reason.

It has already been explained that microbes are normally present in our intestines, that some of these are our friends, while others are our enemies. Now, there is one microbe which inhabits the large intestine or colon, known as the bacillus coli communis, which is a very human kind of microbe. If he is fed upon meat foods and other cooked foods, like a carnivorous animal, he becomes fierce and dangerous, concentrating his activities

on the manufacture of putrefactive products which he dispatches into the remotest parts of the body to do their dirty work. But if, instead of ordinary foods, he is fed upon fresh fruits and vitaminous vegetables, he ceases to be putrefactive, our worst enemy, and immediately becomes fermentive, our best friend. Instead of being fierce like a carnivorous animal he will coo you as gently as any sucking dove, aiding your digestion and disposing decently of your waste matters. It is highly undesirable that anyone should be constipated, but if there is one person who can afford to be so, it is the man who so befriends and tames the bacillus coli communis as to render its activities harmless. It is not so much the stasis that matters, as the putrefaction of the static material. With a natural vitaminous and meatless diet, putrefaction is impossible.

In connection with food, it is necessary to say a word concerning drink. And here again the word simplicity should provide the keynote to the practice. The only simple physiological beverage is water. All the others are variations, some of which are indifferent, others bad. The worst among them from the point of view of a beverage

is milk. The object of a beverage is to supply a means of diluting the food, of dissolving certain materials, and carrying off waste products. The only fluid which really fulfils these and other functions is water. Milk is a fluid food, and is therefore in no sense a diluent; neither is it capable of dissolving anything, for it is already thoroughly charged with soluble material. A glass of milk is in effect a meal. In early infancy it constituted our only food, and even in adults it is capable of sustaining life on quite a high level of efficiency for an indefinite period—provided always that it is uncooked. The idea that milk is a simple beverage which may suitably be used as a means of quenching thirst is a common heresy, as witness the custom of drinking soda and milk, which prevails among athletes. For such a custom there is no physiological excuse: milk is a very concentrated food which is rarely suited to adults. It should be reserved for children. Tea and coffee are both of them beverages of the stimulating type, and both are intoxicants in the true sense of the word. Taken in moderation, coffee is harmless enough; so would tea be, were it not for its popularity in this

country, which leads to its excessive consumption and incidentally to the excessive consumption of cakes, buns, and other saccharine and starchy foods, highly calculated not only to create collops but to cloy the digestive powers.

Alcoholic drinks are in a class by themselves. They have been described as foods. This, except perhaps in the case of beer, is not strictly accurate. Alcoholic drinks, though not foods in themselves, seem in some way to share the oxidation of true foods. This is not an occasion for a contribution to the ceaseless controversy on the subject of the morality of alcoholic drinks in general. My individual opinion is quite definitely in favour of their moderate use. Used and not abused, I do not believe that they do any harm, and I am, on the other hand, firmly convinced that they add considerably to what Matthew Arnold called "the agreeableness" of life. If I were to be asked what I mean by their moderate use, I should reply first that they should not be taken as a matter of routine, but reserved for occasional use. And I should further express a very decided opinion that in any case alcoholic liquors should not be taken

until the day's work is over. To take them at the midday meal on working days is a mistake; to take them except at a meal is little short of a crime. In the old rule of "no smokes before luncheon and no drinks before dinner" there was much practical wisdom. On the other hand, there is no wisdom whatever in the practice of taking cocktails before dinner, which I regret to notice is a growing one in certain classes. Not only do these *apéritifs* tend to create a fictitious appetite, thus leading to an excessive consumption of food, but to the delicate palate they bring a blunting of the appreciation of good wine. The connoisseur will not even look at them.

When all has been said that can be said—and it has been said several times over—against the habitual use of alcoholic drinks, there remains much to be said on the other side. One item in this counterblast has certainly not been proclaimed too often, and it is this. There is a very close chemical relationship between alcohol and sugar, and it is a recognised fact that the one may play the part of the other in the human economy. This is seen in the dislike which drunkards have for sugar and the inordinate love of

sugar which characterises the total abstainer. Now, physiologically, excessive sugar-eating is just as deleterious as the drinking of alcohol. Indeed, if sugar had been endowed with the power of producing drunkenness, it would not have been difficult to prove that it is even more deleterious. Teetotallers are always doughty trenchermen up to the time when their excesses produce indigestion, which, unfortunately for them, is not always. They make up for their virtuous abstention in the matter of drink by the most outrageous excesses in the matter of food. And the food is not only saccharine food. The alcoholic stimulus which they forgo with so much beatific saintliness, they find in meat foods and other stomachic persuaders to the allurements of which they turn the devout and devoted eye of greedy godliness. It would seem that a stimulant of some sort were necessary to latter-day man, and that if for any reason he does not seek it in alcohol, he must find it in other ways. Of these, the way of the meat-laden trencher is that which leads most surely to destruction. Moreover, there is in this connection another consideration which is worth pondering, which is that virile

and vigorous nations have always been alcoholic, and that a widespread cessation of drunken habits has always been followed by national degeneracy. For examples of this it is not necessary to look farther than Spain and Italy.

Mental

The attitude of the ordinary man towards questions of health has altered but little since the Middle Ages. Disease was then a disaster which was imposed upon a person by an omnipotent but capricious deity, Who, in the words of Robert Burns, sent, " one to Heaven and t'other to Hell, all for Thy Glory, and not for any good or ill they'd done afore Thee." This fatalistic attitude still persists, and is even more persistent perhaps among the educated than amongst the ignorant. Such people do not regard illness as the result of a cause ; still less do they regard it as the result of a remediable cause. Heredity they are ready to accept, mainly because it carries with it a suggestion of good breeding, but in the vast majority of cases the causes invoked to explain the occurrence of disease, are such elusive en-

tities as chills, overwork, and inclement weather, anything in fact which is outside the personal responsibility of the individual Knowledge of Biology has brought very little wisdom in its application to our ordinary everyday lives. Man, in the view of most, is not an evolved animal, but a person born in the purple of plenty, whose privilege it is to enjoy the good things which civilisation supplies, without paying any unpleasant penalty for so doing. Man, it is argued, having invented civilisation, is entitled, in the fullest possible measure, to the benefits thereof, and that a just and beneficent deity has ordained that his animal nature shall adapt itself to the exigencies of material progress. Disease is thus an incident which occurs in direct contravention of Divine intention, a natural upheaval, like an earthquake, due to the operation of some cosmic force which has slipped off the rails. As it is impossible to foresee such difficulties it is obviously impossible to prevent them, so the only course which remains open is that of doing our best to counteract them—with a bottle of medicine.

Such, in substance, is the attitude towards disease which still obtains even amongst

educated people; and, in justice it must be admitted, that it is the aftermath of the views inculcated into the public by the medical profession in the days of our forefathers. The public still demands a remedy for acquired ills; it seldom demands, it will indeed scarcely tolerate, advice as to how such ills may be avoided. This is not to say that remedies are of no value. In certain diseases they are of the very highest value: quinine in malaria, and mercury in syphilis, afford two outstanding examples of corrective drugs which have conferred incalculable advantages upon the human race. But the number of diseases which are capable of being influenced by drugs in a manner as direct and dramatic as these, are very few. These represent diseases produced by living parasites introduced from without, which flourish on the human soil, and, if undisturbed, eventually destroy it. The vast majority of diseases are either microbic, in which case they are acute, or metabolic, in which case they are usually chronic. Microbic disease as a rule is unable to obtain a foothold on healthy human soil, so that its occurrence denotes a state of body whose resistance has been lowered by some mal-

observance of Nature's laws. Had the defences been sound, the invasion had never been successful. When it does occur, the modern physician does not try to cure it with drugs; he merely stands on guard against complications, and does his best to relieve urgent symptoms. He recognises that he can guide, but cannot cure. Most, though not all, microbic diseases, such as typhoid fever and pneumonia, are self-limiting, whereas syphilis, for instance, is not. In the former, active interference is seldom necessary. In the latter it is essential. In parasitic disease the doctor does the actual curing; in microbic disease, it is the natural defences of the body which do the curing. Microbic diseases are many, parasitic diseases are few. In spite of the knowledge of these facts, the public continue to demand "cures" in microbic and other types of disease which are, by their nature, insusceptible of cures. They might just as reasonably demand a bottle of medicine for a broken leg.

Metabolic disease, as represented by gout, rheumatism, diabetes, high blood-pressure, and the like, is the result of a persistent disregard of Nature's laws. In the early

days of such disregard the effects are very slight, but these effects gather force and accumulate with the years, so that after a certain time very definite symptoms declare themselves. When they arrive the victim is all too apt to attribute them to something of recent occurrence, and to expect in consequence that they may be caused to disappear by something contained in a bottle called a tonic. Bacon says that "strength of Nature in youth passeth over many excesses which are owing a man till his age," meaning that defiance of Nature, though it may go unpunished at the time, will always be followed by retribution later on.

It is the fact of this deferred retribution which people find it so difficult to accept. When it has overtaken them, they appeal to the doctor for help; and they invariably expect that help to take the form of a drug —"to pull me together," "to neutralise the acid," "to cut the phlegm," "to loosen my stiff joints," are common expressions. Now it should be realised that it is not in the power of anyone, however learned and gifted, by drugs or vaccines or what not, to undo the work of twenty years in a few weeks. For the unsound work has to be

undone, the faulty edifice has to be pulled down, and even its foundations rearranged, before any real good can ensue. And the undoing and the pulling down and the rearrangement must be performed by the patient himself: the doctor can only guide him. He can take him to the water, but he cannot make him drink. If the patient is to succeed he will need all the common sense, all the courage and all the determination he can summon to his aid, for physiologically he must be born again. Treatments can be of no avail unless there is such a change of heart and outlook as will banish the belief in miracles and bottle-imps, and substitute for these false gods a simple faith in a simpler life.

Man is unfortunately so fully persuaded that the habits in which he has been brought up are necessarily good and healthy habits that any suggestion to the contrary excites his violent opposition. The appeal to Nature leaves him cold and incredulous. He is convinced that the little luxuries to which he has accustomed himself, "to keep up his strength," are essential to his well-being, and any suggestion that they must be relinquished sends him off to the nearest

miracle-monger. That is the reason why quacks and charlatans flourish in our midst. No one, in his heart of hearts, seriously believes that these people know more than the members of the orthodox profession; but inasmuch as they promise miracles while interfering little, if at all, with the established habits and customs of the individual, and as the subconscious hope in the efficacy of miracles is still latent in civilised man, their methods will continue to appeal to a certain number of people. They afford a way out, a means of evading the real issue.

The belief in miracles, in drugs and treatments, in antidotes and alterants, in sedatives and specifics, the fetishes of our forefathers, constitutes the real stumbling-block to a more enlightened mode of living than that which is now loading our communities with preventable disease and premature death. The study of biology and the lessons which we are privileged to learn therefrom, teach us that disease is not a burden placed upon us "all for Thy Glory," but is merely an expression of man's stupid persistence in harmful habits. It is the duty of the present generation to start and prosecute

a campaign against these habits, and to substitute habits which are in consonance with common sense and the laws of physiology. The old injunctions against gluttony, sloth and idleness must be brought to a finer, a more individual and more practical point, by showing that their consequences are not problematical and remote, reserved for a future life, but are immediate, real and material, cankering the present life, which they not only shorten, but fill while it lasts with wholly preventable pains and penalties. In order to do this, it is first of all necessary to demolish the heathen idols which we have inherited, and realise that drugs, though they be excellent and reliable servants in times of trouble, are very undesirable companions and most tyrannical masters. The success of pharmacology is become the stumbling-block of healthy living. The way out, viâ the tabloid or the bottle of medicine, has prevented man from expiating to the full the crimes which he perpetrates against the ark of the covenant which is within him. In the absence of antidotes he would rue his poisons to better purpose. He would learn salutary lessons from his lapses, and be more content than

he now is to listen to words of physiological wisdom.

Several movements to break away from this purely materialistic attitude towards disease have been attempted in the last two decades. These movements, confined chiefly to the intelligencia, have resulted in such extremes as Christian Science, Higher Thought and the like, the basic principles of which seem to consist in a complete negation of the material or animal side of life. Such movements have undoubtedly proved very useful to many people who have become obsessed with the importance of their own bodies. They are mostly people of the leisured classes who pay the pathetic penalty of introspective misery for the sinister privilege of silken repose. Another means of dissipating such vapours, and on the whole a better one, is compulsory employment of a congenial kind. Poverty is not infrequently a dispensation of Providence.

The new psychology to which we were introduced just before the war, which undoubtedly did much to alleviate war neuroses and post-war mental disturbances, was originated by Freud and elaborated by Jung. Their teaching represented another type of

break-away from the purely animal or physiological attitude towards life. It was based on consideration of the fact that the influence of sex, which enters so largely into the normal life of the adult animal, becomes, in the case of human beings, so repressed by the exigencies of social life, that it is liable to be diverted into unnatural and undesirable channels, giving rise to complexes, which impose real mental misery and consequent disability upon potentially normal people. Jung extended this principle beyond the region of mere sex, and showed what was indeed in a sense, already well recognised, namely, that an uncongenial environment of any sort was liable to give rise to complexes which were in every way as potent for evil as complexes founded on sex. The case, for example, of a young man of the artistic temperament who is placed in the purely materialistic and methodical atmosphere of a lawyer's office, and who in consequence goes wrong, as the saying is, would be enabled to make good, if taken away from his hated surroundings and given some employment in which his tastes and gifts would have some opportunity to develop and flourish.

It may be that we have heard rather too much of this side of the question, and not enough of the view of those who hold that healthily minded people should cultivate and exercise adaptability; that to discipline your natural inclinations is to develop your character; that it is just as foolish to pander to so-called temperamental tendencies as it is to pander to undesirable tastes. The real road to success would seem to lie between these two extremes, neither of which take sufficient cognisance of the paramount importance in this, as in all other matters of mental equilibrium, of a perfectly sound and well-conditioned material body. If the blood which waters and drains your nervous system is not good pure blood, then your nervous system cannot be expected to respond normally to normal stimuli, and thus to adapt itself to difficult conditions. The animal within us is still uppermost.

This insistence upon the animal side of our nature must not be taken to imply any desire to belittle the spiritual side. It is, on the contrary, recognised to be the glory of the genus homo that it is he alone among the animals who has evolved a nervous system, which enables, and indeed compels,

him to strive after the things of the spirit. But in order to arrive at any satisfactory result he must do his striving within the terms of his reference. And the first clause in those terms is one which enjoins upon him the duty of regarding his body as the habitat of the spirit, a sanctum to be treated reverently, with dignity and restraint. The essentials of the complete edifice are a sound and wholesome body, acting as the foundation for a well-balanced spiritual superstructure.

In any scheme of living it would thus be unscientific to the point of absurdity, to attempt to relegate the mental side of life to a position of minor importance; for, given the conditions above mentioned, it immediately becomes the side of major importance. The spiritual and intellectual side of life, religion in its broadest sense, literature, science, art, and the humanities generally, comprise for a large and ever-increasing number of people, everything that makes life worth living. The pursuit of the ideals which are founded upon, and moulded by, such studies, is the real path of progress and happiness for the human race. It leads to the only goal which is in

any degree worthy of ultimate attainment. The appreciation of the value of these tastes and acquirements has been a matter of laborious evolution. It had reached to a very high state of development in previous civilisations, with which, in each case, it unfortunately perished. But it has always reasserted itself in each successive civilisation, thus proving not only its vitality, but its essential godliness.

Now the chief factor in the cultivation and dissemination of this spiritual side of life has been, and must ever remain, the force of suggestion. The agency of suggestion became operative very early in evolutionary life. The influence of the herd or tribe upon each individual member of it was the force which lent power and cohesion to the tribe as a whole. The member who was not amenable to this influence became an outcaste, and was thus prevented from perpetuating his peculiarity in his progeny. The factor of suggestion had, therefore, a survival value and gathered strength with the lapse of time. To-day its powers may be witnessed everywhere. It is apparent even in so intimate and individual a matter as religion. You are a Christian or a Turk,

a Roman Catholic or a Presbyterian, not by conviction (except in a very small minority of cases) but by suggestion. The opinions of the herd or tribe which constituted your infantile and youthful environment determined the trend of your religious belief. And not only your religious belief. You are a gentleman or a cad, a Chesterfield or a costermonger, not as the result of any deliberate choice on your part, but because of the suggestive influences by which you were surrounded in the malleable years of immaturity. It must not be supposed, however, that the power of suggestion ceases to become operative when maturity is reached. The power of public opinion generally, and still more the weight of opinion in those who make up the human environment of each individual, remains a potent factor in his conduct even in advanced life.

Now it has to be realised that for suggestion to become effective it must be auto-suggestion. That is to say that an outside suggestion can only be translated into action or conduct when it has penetrated your perception and carried conviction with it. Both the perception and the conviction may be quite unconscious, but they are

none the less both necessary and effective. Suggestion is thus seen to be not only an enormous power, but a power which the individual exercises over himself. The fact that its operation is so frequently unconscious must not blind us to the fact that it can be exercised consciously, that the more it is exercised consciously the more capable does it become of moulding the mind and conduct of the operator.

It is no part of my present purpose to enter into the intricacies of auto-suggestion, but I may be permitted a reference to one aspect of the matter which has proved a factor in many failures. Psychologists recognise what is known as the "Law of Reversed Effort," which may be briefly stated by saying that a negative suggestion is of no value: to be operative a suggestion must be positive and dynamic. If, for instance, a man says to himself "I will refrain," he is unconsciously suggesting to himself the probability of failure, whereas if he says to himself "I will succeed," he is suggesting to himself a combat in which he is to be the victor. The imagination plays a far more important part in successful auto-suggestion than either the reason or the will.

And yet when all has been said concerning the mind of man, we come back, even in the sphere of his mind, to the paramount importance of his body. There are certain glands in the body called ductless or endocrine glands, whose duty it is to secrete certain essences called hormones which, according to their admixture in the individual, determine not only his outward seeming, but also his mental attributes. It depends, for example, entirely upon these glands whether an embryo is to be male or female, and consequently whether he is to be saddled with a male mentality or decorated with a female mentality. Nor do the activities of the endocrines stop there. Within the sphere of people of the same sex the enormous differences between individuals of that sex are determined by the relative amount of hormones secreted by the glands. A certain combination will produce a tall, dark man with a yielding temperament, while a slightly different admixture will result in a short, fair man with a combative character. Then again, one kind of association among them will result in the effeminate man, another kind in the mannish woman; the permutations and combinations are

infinite, and are responsible for the infinite variety among people whom one would expect to be almost identical—children of the same parents, for example. Moreover, these glands have their diseases and their functional disabilities, and these departures from health show themselves not only in the physical, but also and perhaps predominantly in the mental and temperamental outlines of their possessor. A man is, in fact, at any given moment, the resultant of his endocrine hormones.

Part II The Art

THE measures which should be adopted by anyone wishing to keep himself in good health might be summarised under the term "enlightened common sense." To apply common sense to any subject it is necessary to have some acquaintance with the basic laws of that subject. These, I have endeavoured in the first part of this book to set forth in such a manner as to render them easy of comprehension to educated people. I now propose to enter into some detail, which for the sake of convenience I will discuss under the headings of the organs of the five senses, namely, skin, nose, eyes, ears, and mouth.

The Skin,

or integument, the largest organ in the body, combines the functions of common sensation, protection, and secretion. It is also an accessory organ of respiration. In the

matter of common sensation, the sense of touching and being touched, there is nothing except the superlative called pain, which need detain us. Pain has been described as "the cry of a nerve for healthy blood," a not inaccurate aphorism which should serve to impress upon us that pain is a warning which should not be neglected. It is a great misfortune that there should be no means of gauging the amount of pain from which a person declares himself to be suffering. One person will demand morphia for a degree of discomfort which another will refuse to consider seriously, so that the onlooker, unless he be very experienced, is at a loss to know how to deal with the situation. The most intolerable pains are those which arise in bony cavities, in which swelling is mechanically prevented, such as the ears or the sockets of the teeth. Very considerable pain may arise from the distension of a hollow organ, such as the stomach or the bladder. Irregular contraction of muscle, as in the intestines, may give rise to very demoralising pain; indeed, abdominal pain of any kind, probably on account of its importance, is usually accompanied by a peculiar and characteristic degree of prostration.

Pain may also be very severe when it is due to the irritation of a sensory nerve, such as the sciatic. Pain often occurs as the result of the over-use of muscles, particularly of special muscles, such as those which contract the pupils of the eyes. Pain is often "referred," as the saying is. This means that the pain is felt in a part which is remote from the seat of the mischief which causes it. It is therefore never safe lightly to dismiss as "a little rheumatism" a persistent pain in, say, an arm or a leg. The real trouble may be in some very important organ. The person who says he does not mind pain has never experienced it.

The protective function of the skin, that is, the protection from injury which the integument affords to the delicate underlying parts, is perhaps its principal function. If the vulnerable organs in the abdomen, for instance, had no such buffer against the harshness of an outside world, man would be like an oyster without its shell. A less obvious form of protection is afforded by the colouring matter which in varying degrees is present in the skin of every one except the albino. Colouring matter or pigment is

developed to protect the internal organs against certain rays of the solar spectrum. The equatorial races are black and the nordic races fair, because the organs of the former require protection from certain rays, whereas those of the latter do so in a much smaller degree. In this climate the sun shines in its full strength for a few months only; if it did so all the year round, the English would be a much more deeply pigmented people than they are. Sunshine, as we have already seen, has a very important influence upon health. Exposure to the summer sun should be gradual, especially in the case of fair-haired people. Inasmuch as dark clothes protect the surface of the body from the sun's rays much more effectually than light-coloured clothes, the fashion of wearing white raiment in summer-time in this country is open to some objection. In France, where the sun is much more powerful than it is here, the men, at any rate, never wear light-coloured clothing. If a person tans readily as the result of exposure, he is responding normally to the stimulus, and the exposure is beneficial. If, however, instead of tanning he tends to burn or freckle, care should be taken to avoid

sudden full exposure. Burning means that the exposure has been excessive, and when it is spread over a large surface it is liable to be accompanied by constitutional disturbances which, though not necessarily grave, are, especially in the case of children, sufficient to give rise to disquieting symptoms. Freckling means that the power of the individual to produce protective pigment is very limited. More than ordinary caution should therefore be exercised by such a person in subjecting large areas of his skin to the full influence of the summer sun. He should wear dark, or, at any rate, grey clothes in preference to white. A considerable development of hair on the trunk is another indication for caution in this matter, for hairy people are seldom able to develop protective pigment. Hair is a substitute for pigment; or, rather, hair, which was evolved first, has, in the case of man, been largely replaced by pigment. The two subserve the same purpose, so far as light is concerned.

Secretion from the skin, called perspiration or sweating, is primarily a heat-regulating mechanism. As we have already seen, it is also a means of ridding the system

of certain impurities. It may be provoked by external heat, such as the sun's rays, dry heat, as in a Turkish bath, moist heat, as in a vapour or ordinary hot bath. Luminous hot-air baths are said to act in the same way as sun-heat. They are certainly very efficacious. The action of perspiration as a depurator is most marked when it occurs as the result of active muscular exercise. The muscles burn up certain materials which seem to find a more easy exit through the skin than otherwise. For this and other reasons vigorous muscular exertion is a physiological necessity to every human being, and every one should take as much of it as is compatible with the claims of his serious business in life. The plea which is usually advanced for backsliding in this respect is want of time. It is in reality no excuse. A man can always make it a habit of walking back from his work, a part of the way at any rate, and he can always devote half an hour once a day—either before breakfast or before bedtime, or both —to the regular performance of certain exercises, with or without such adventitious aids as dumb-bells or pulleys. There are several "systems" of exercises on the market,

all of which have many merits. It matters very little which system is adopted, provided that the exercises are performed regularly and conscientiously in such a way as to call for real effort. These exercises should be performed in a well-ventilated room, preferably with the window wide open, and the exerciser should wear as few clothes as possible. Two sets of muscles deserve special attention; those of the legs and those of the abdomen. The former can be kept in good order by vigorous walking, reinforced by such movements as the selected system may advise; by bicycling, lawn tennis, squash racquets and other games—when these can be obtained. It is clear that man would not have been provided with such large and powerful muscles as those which adorn his lower extremities had not Nature intended them to be very fully employed.

The importance of well-developed abdominal muscles may be realised from the fact that these muscles constitute the only barrier to the sagging downwards and forwards of the organs contained within the abdominal cavity. This dislocation is of such common occurrence, and is attended by such disas-

trous results, physiologically and artistically, that ingenuity has been exhausted in the invention of belts and supports and corsets of every shape and material. When these contraptions become necessary it is no doubt well to appeal to them. But they never ought to be necessary, for they constitute a confession on the part of the wearer that he has led a lazy life of unhygienic ease. To restore a lax and protuberant abdomen to its proper place is a matter of diet as well as exercise; to preserve an abdomen from becoming lax and protuberant is usually a matter of exercise alone. Thus: lying on his back on the floor, not on the bed, the operator slowly lifts his legs, straightened at the knee, until they are at right angles with his trunk, while his hands are employed in pinching up and massaging the skin and muscles on the abdomen. Then the legs, still straight at the knee, are gradually lowered again. This should be repeated four or five times at first, and as the effort becomes less, the number of times should be increased up to fifteen or twenty. With his feet tucked under the open lower drawer of a chest of drawers, and his arms above his head, the exerciser

now raises himself gradually, not jerkily, into the sitting posture. This manœuvre should also be repeated several times according to the effort entailed. In doing these, and indeed any muscular exercises, it should be remembered that it is essential to perform them deliberately with a full consciousness that certain muscular groups are being exercised. Rapidity of performance is not desirable because it is liable to introduce the element of swing, which obviates the necessity for the tight and hard contraction upon which the efficacy of the movement depends.

I have said that these exercises should not be done on the bed, but I hasten to add that it is better to do them on the bed than to leave them undone. There is, indeed, a system which comes from America by which a whole variety of exercises are performed actually in bed. I have heard the system well spoken of, but I have no experience of it. Probably the best that can be said for it is that it is very much better than no exercise at all. Another system which may appeal to some is that by which one learns to contract two opponent sets of muscles at the same time.

For example, the biceps bends the arm at the elbow, while the triceps straightens it. These two muscles can be made to contract simultaneously, with the result that although practically no movement takes place, a great deal of work is done. The principle is applicable to other groups of muscles, but its application requires instruction in the first place, and considerable practice. The plan has the advantage of enabling one to exercise certain muscles without making oneself conspicuous during periods of enforced idleness, as in an omnibus or a train. Another advantage is that when you have learnt how to do it, such is the warming effect of muscular contraction, that you need never feel really cold.

Important as exercise is from the point of view of the well-being of the muscles themselves, and all that their adequate contraction denotes in the matter of the oxidation of waste products, and other matters already referred to, it is necessary to remember that unless muscles are used, joints are not moved, and that if joints, are allowed to remain inactive, even for a short space of time, a species of rust collects

about them, limiting their movement and causing pain. Moreover, muscular contraction is one of the forces by means of which the circulation of the blood is carried on. The veins of the trunk and lower limbs are obliged to return the blood towards the heart against the force of gravity, and this they are unable to do without the firm support of well-developed and well-exercised muscles. This consideration supplies another and a very weighty reason for paying very special attention to the exercise of the muscles of the abdomen and lower limbs.

In these climates it is necessary that the skin should be protected not only against the winter cold, but also against the summer sun. The tendency of most people is to overclothe themselves in both seasons. In summer they overclothe themselves lest they should "catch a chill" after being warm; in winter they overclothe themselves lest they should "catch a chill" from being cold. Chills of that type are in reality wholly illusory. It is very unpleasant to feel cold, but the more clothes you wear, the more certain are you to be sensitive to cold. The skin reacts to cold by contract-

ing, and unless its contractile power is kept in good training, it fails to react as promptly and as adequately as it ought to do. To overburden it with unnecessary clothing is to prevent it from being exercised; complete contraction fails to occur, and the sense of chilliness is increased. No material is warm *per se*. The warmth comes from the body, and a so-called warm material is one which imprisons air in its meshes, for air is a bad conductor of heat. Such a material is wool. The objection to wool as a material for underclothing is that it is relatively unabsorbent. The best materials for this purpose are linen and cotton, so constructed as to imprison the air in its meshes, for then they are both warm and absorbent. There are many such on the market, and when light in weight they fulfil all the conditions of a material suitable for underwear.

All clothing should be worn loose. Constrictions anywhere interfere with muscular action and impede and impair the circulation of the blood. Even sock suspenders are objectionable, and garters even more so. Tight boots and shoes are objectionable because their evil effects are not easily

recognisable as such. Fatigue, attributed to other causes, is often due to the undue constrictions of the feet. This also applies to light socks and stockings, a potent, but little suspected *center* of *malaise*.

The part of the body to which constriction is usually most firmly and diligently applied is that which above others should be free from any semblance thereof, namely the neck. The narrow isthmus which connects the head with the trunk contains a large number of very important structures; muscles, arteries, veins, nerves and glands, the main air passage, the trachea, and the main food passage, the gullet. These are all closely packed in front of the bony spinal column. The blood-vessels and nerves form the connecting links between the brain and the rest of the body, and are in this respect the most important organs in the body, whose full freedom of activity should on no account be interfered with. And yet modern man so arranges his neckwear as to compress all these organs against the unyielding spinal column. The degree of compression to which some will submit whilst loudly protesting that there is no compression at all, is sometimes very aston-

ishing, presumably because it has been gradually applied. If we look at the customs of those who are really active in sports, cricketers, tennis-players, oarsmen, we see that their necks are always perfectly free, and yet the people who are engaged in brain work, which is the work *par excellence* requiring a good supply of blood to the brain, and a free drainage therefrom, are above all others, those who wear the highest and tightest collars. If you ask a person thus trussed and corsetted about his neck to bend down as though to lace his boots, the sudden and alarming congestion with which his face becomes suffused will prevent you from repeating the experiment. The limp, collars so often worn, are apt to be even more dangerous than those which are starched, not only because they shrink in the wash, but because those who affect them seem to find it necessary to keep them in their places by pulling the tie so tightly as to threaten strangulation. Neckwear which fails to admit one hand quite freely up to the knuckles between itself and the skin, is injuriously tight. It is well to remember that the gaseous exhalations from the skin find a natural exit at the neck. By no means

the least objection to a tight collar is that it imprisons these unhealthy gases.

It is the fashion amongst the highbrows to bring many charges against the apparel of latter-day woman. Whatever may be said against it on other grounds, on grounds purely hygienic, its general lightness and the complete absence of any constriction about the neck are items much to be praised.

The fashions which prescribe these are infinitely preferable to those which ordained the high dog collars and heavy flannel petticoats affected by our grandmothers. Moreover, the corsetted abdomen of to-day is much more hygienic than the corsetted waist of yesterday, even though the former should entail, as it seems to do, the inartistic abolition of the buttock.

Circumstances have combined to render it necessary that modern man should wash his skin with soap and water: the face and hands frequently, the rest of the surface at least occasionally. Both have become so much a part of the ordinary ritual of cleanliness that their advantages need no insistence. The reclining bath which has now almost completely replaced the "tub"

or sitz bath must not be considered as in every way superior to the latter. If the water in the bath is cold, as in the case of all healthy people it should be, the reclining bath is hygienically inferior to the tub; for the reason that in the latter the cold is applied to the surface piecemeal, whereas in the former there is a sudden complete immersion. The piecemeal application is preferable because the blood being transferred from one part of the surface to another, there is less shock to the whole system than when, by cold affusion to the whole of the surface at once, the blood is driven inwards to the internal organs. For this reason the advent of the reclining bath has done much to render the cold bath unpopular, which is a great misfortune. The substitution of a hot reclining bath in the morning for the old-fashioned cold tub is an even greater misfortune. Hot baths should be reserved for bedtime, or the hour before the evening meal—at any rate they should not be taken until the day's work is done. It may be admitted that a quick hot bath in the morning is free from reproach, but no one ever really takes one in that way. The usual practice is to

linger in its languorous warmth until a condition of thorough relaxation is reached. This is a most unsatisfactory condition in which to begin the day, even when it has been partly modified by rapid cold sponging, which it seldom is. Cold sponging affords, indeed, the only possible justification for the morning hot bath. The cold water, which should be really cold, should be applied very particularly to the head and the abdomen, to the latter more especially, in order to key up its muscles and blood-vessels for the day's work. A hot bath at night is an excellent means of procuring a good night's rest, especially in people of an irritable or nervous disposition. Bath salts and mustard are very agreeable and perfectly harmless adjuvants to the evening bath.

As the art of living includes the artistic side of life, and as the hair of the head in both sexes is an ornament worth cultivating, it seems desirable to say something on the subject of its preservation. The health of the hair, like the health of every part of the body, depends upon a pure blood supply. Feeble people have feeble hair, vigorous people have vigorous hair, at any rate at first. If hair is to be kept in good condition,

it must be stimulated. In the absence of stimulation the roots become apathetic and eventually atrophy from inanition. When women still wore long hair, the weight of the hair itself stimulated the roots and the necessary brushing and combing reinforced the stimulus. For this reason they never grew bald, whereas their husbands and fathers who wore their hair short and kept it in its place by means of greasy lotions, which obviated the necessity for more than a very perfunctory brushing, grew bald early. Now that women bob their hair and shingle it, they too will grow bald unless they remain as diligently attached to the hair brush and other means of stimulation as they were when they still retained their tresses. Threatening baldness should be met not by so-called stimulating lotions but by vigorous friction with brush, comb, and finger, and by moving the scalp on the underlying bone. All this takes time and energy and perseverance: but there is no other way, no royal road.

The pressure of the hat is sometimes cited as a cause of baldness. I do not personally believe in such a cause, for the reason that hats are seldom on the head long enough

to do any real damage. The direction in which hats are calculated to do harm—male hats—is in the direction of harbouring dirt and thus of causing infection of the brow and hairy scalp. Men will wear the same hat, week after week, and month after month, perspire in it and leave it about in all manner of odd places, and never once subject it to any more cleansing process than a perfunctory superficial external brushing. A hat which is worn constantly should be kept clean. The inside leather band should be turned outwards and washed with soap and water at least once a week. Except the hands, the skin of the brow is probably the dirtiest part of the body, and yet very little attention is usually paid to its artificial covering. Even vests are occasionally sent to the wash.

The Nose

is usually thought of as the organ of smell. In man such is in reality the least important of its three functions. Of the other two, one has a very close connection with breathing, the other with voice-production. The sense

of smell in human beings is a very attenuated affair compared to what it is in the higher vertebrates, except of course the apes. Happily for him, perhaps, town-dwelling man very soon loses what little perception of odours he was originally given, probably because his olfactory nerves are so overstimulated by the smells and gases of great cities that they rapidly wear out. Country-dwelling man, inasmuch as his olfactory sensations are practically confined to natural odours, manages to retain his sensitiveness in this direction much longer than the town dweller. At the age of 60 the latter has lost all his finer olfactory perceptions.

The function of the nose which is of the greatest moment to civilised man, especially to the town dweller, is the action which it exercises upon the inspired air. Ordinary air, especially the air of towns in this country, is cold and laden with particles. When this is passed through the nose on its way to the lungs, it becomes warmed and filtered, so that on arriving at its destination it is both warm and pure—as pure at least as a filter not designed to meet a murky atmosphere can make it. It follows that every

one should breathe through the nostrils, and not through his mouth. In order to test your efficiency in this matter it is necessary to block each nostril in turn and assure yourself that a perfectly free airway exists through the unblocked nostril when deep inspirations are made. Some people who breathe through their noses under ordinary quiet conditions, are nevertheless obliged to open their mouths when taking exercise or during sleep; such people have not fully patent nasal passages. The penalty which must in the long run be paid for even a partially occluded nasal airway is chronic bronchitis and other troubles of the upper air-passages; so that if there is any suspicion that both sides of the nose are not quite clear, the advice of a specialist should be sought.

The function of the nose which is connected with voice production is purely artistic. There are certain sinuses and hollow chambers connected with the normal nasal passages which serve as reverberating chambers to the voice, and when free communication is interrupted, as in a common cold or in people with adenoids the voice loses its resonance. The lachrymal ducts which

carry off the overflow of tears from the eyes, discharge themselves into the nose. That is the reason why pathetic passages in melodramatic plays produce so much kerchief work among susceptible members of the audience. Having regard to the fact that the atmosphere of large towns is usually heavily laden with particles of coal and other kinds of dust, all of which is irritating and much of it in some degree poisonous to the delicate mucous membrane of the nose, it is highly desirable that the inside of the nostrils should be cleansed as often as possible. Few people take this very simple and very obvious precaution against outside infection ; if it were to become more general it is quite certain that the various types of colds and catarrhs would be less devastating than they now unfortunately are. Every one should wash the inside of his nose whenever he washes his face. If by so doing he can provoke a hearty sneeze, thereby helping to empty the nasal sinuses, so much the better. This little rite should be observed as a routine measure at the morning toilet and before retiring for the night. In times of epidemics, during and after railway journeys, in dry weather when there is much

dust about, it is well to supplement the ordinary soap and water toilet of the nostrils by anointing their insides with some of the ointments containing volatile antiseptic oils, such as eucalyptus. There are many such on the market, conveniently put up in collapsible tubes.

By far the best and most efficient means of cleansing the nasal passages is by means of a douche, filled with some mild cleansing fluid, such as well diluted Glyco-thymoline. The proper employment of a douche requires some little practice, the great secret of success being to keep the mouth widely open while the fluid is allowed to run up one nostril and out at the other. A douche must on no account be confused with a syringe. Syringing the nose is an altogether indefensible procedure under any circumstances. The force of the syringe drives the material from the nose, up the Eustachian tube, into the middle ear, whence arise mastoid abscesses and all kinds of horrors.

There is a very important nerve called the pneumogastric which, as its name implies, is closely connected both with the air-passages and the stomach. Thus it comes

about that when the air-passages are irritated, so also is the stomach. This is seen in chronic disease of the lungs, such as consumption, which is very often attended by some form of indigestion. But the boot is far more often on the other foot. That is to say, it is far more common to find irritation of the stomach causing troubles in the air passages than the other way about. It is indeed safe to affirm that "bronchial" colds and coughs more often arise in the stomach than in the air-passages. The person with a bronchial catarrh will usually put himself to bed with the sympathy of his friends, will surround himself with poultices, linctuses, bronchitis-kettles, and "feed himself up" with beef-tea and mutton broth and other means to "keep up his strength"; whereas what he really needs is a blue pill and a black draught followed by two or three days' starvation. Such a man will tell you that he must have "caught a chill," Possibly, but that kind of chill has a curious preference for over-fed people. There is in reality no chill and no mystery about such cases: they are due to irritation of the gastric branch of the pneumo-gastric nerve; they require not pity, but pills

and other purgatives; profitably followed by a fast.

The Eyes

The eyes have acquired enormous importance in the equipment of the genus homo. Originally used chiefly for long distance, the advance of civilisation has determined that their activities should now be almost entirely restricted to middle distance and near vision. This consideration supplies the reason for the comparative rarity of perfectly normal vision among town-dwelling children of the educated classes. The adequate structural development of the eye, demands that it should so to speak be "brought up" on long distance vision, just as the adequate development of the bony framework demands that it should be "brought up" on vigorous muscular exercise and fresh air. The practice of teaching children from black boards is better than teaching them from books, but neither is entirely justifiable unless it is freely diluted with practice in long distance vision. The eye is an optical instrument and stands alone among the organs of the body in the

fact that its adequacy for the task which it is intended to perform can be measured with mathematical precision. The large and ever increasing number of people who are obliged to wear glasses constantly, testifies not only to the increasing knowledge and skill of oculists, but also, and more emphatically to the fact that too little attention is paid to the developmental exercise of the eyes in childhood. From the moment it begins to be used as an organ of observation, the present-day eye is given too much near work and too little distance work, with the result that it develops, structurally along faulty lines, and when fully matured it requires glasses to correct the faults. Now, in the matter of the eyes it is a fact that minor errors are apt to be more serious than gross errors. Gross errors are easily detected and corrected, whereas slight errors are not. If a child cannot see the figures on the black-board his inability soon becomes apparent: but if his next-door neighbour is able to see them at all, it generally goes unsuspected that he may be seeing them with difficulty. The latter goes on seeing them, and rapidly adjusts his ocular apparatus so as to obtain perfectly

clear definition, and this adjustment soon becomes habitual with him. This means that energy which properly belongs elsewhere is illegitimately attracted to the visual organ, so that although the child sees well, he does so at a physiological cost which it becomes increasingly difficult for him to pay.

This matter in its general application has already been considered under the heading economy of energy, but its particular application to the question of vision is so important as to deserve some further particulars. The physiological price which a person may have to pay for uncorrected slight errors of refraction may take many forms. By far the commonest of these is headache. The headache of eye-strain is liable to be worse in the morning, on waking, especially if the night before the eyes have been severely taxed, as in reading, or taxed in an unusual manner as at a theatre or a cinema. A picture gallery, and sight-seeing generally are very liable to determine the headache of eyestrain. The character of the pain is usually a dull ache, which attacks by preference the brow, or one side of it, or the back of the head. The pain may

however be very acute; sharp, cutting and paroxysmal in quality. Pains of whichever kind are often accompanied by an intolerance of light. In severe cases they may also be accompanied by vomiting. The majority of so-called bilious attacks are ocular in origin.

Nearly all cases of eyestrain sooner or later give rise to symptoms referable to the stomach, indeed a very fair proportion of the results of eyestrain confine their manifestations to that organ, with results which are sorely baffling both to physician and patient. Attacks of indigestion are frequently attributed to the eating of some particular kind of food, whereas more often than not they are due to eyestrain. The effects of eyestrain may declare themselves, not in any particular organ, but in the system at large. The condition spoken of as nervous debility, neurasthenia and such like, though it may own causes other than eyestrain, should always excite a suspicion that the eyes require the attention of an expert refractionist. I insist upon the word "expert" because, as I have already explained, it is the minor errors which are difficult of detection and still more difficult of correction,

which give rise to the symptoms. Gross errors do not matter from this particular point of view because, being gross, the patient is unable himself to correct them. He consequently does not make the attempt, and there is no illegitimate transference of energy. Eyestrain is capable of inflicting a great deal of misery upon its victim, but it carries with it at least one not inconsiderable advantage. I have said that its symptoms almost invariably show themselves in the stomach, and one result of this localisation is all to the good. It is that the subjects of eyestrain are very seldom gross feeders, so that they tend to escape from the consequences of over-eating from which in one form or another the majority of normal people habitually suffer.

Having regard to the amount of work in the world which now revolves about the pivot of ocular efficiency, and considering the trick which slight errors have of masquerading as defects in other organs, it is a wise rule which bids parents and guardians to satisfy themselves by expert advice that the eyesight of their children and wards is as it should be, before the latter take to serious study. Many an unexpected failure

in the ordeal of examinations which has been attributed to idleness or lack of application has in reality been due to some slight ocular defect. A great deal of indefinable *malaise* in adults, to say nothing of seeming defects in character and even in morals, have been found on investigation to depend on the same unsuspected cause. Eyestrain is undoubtedly responsible for a large measure of wretchedness in civilised life which a little forethought and understanding would easily remove. It is a by no means uncommon cause of insomnia. It is one, at any rate, of the causes of sea sickness, and probably the principal cause.

The Ears

What are commonly called the features of the face, eyes, nose, mouth and chin, are generally regarded as revealing certain mental and moral characteristics, but none of them are in reality so tell-tale as the external ear. The lobe of the ear, for example, is peculiar to human beings, and therefore represents a high grade of development. It is nevertheless completely absent

in a large number of people. Another sign which indicates a certain measure of degeneracy is the little elevated tubercle or point, which is not infrequently present near the upper part of the margin of the ear. This, according to Darwin, is the representative of the tip of the pointed ear found in most of the lower annimals. Deviations from the normal human ear are also to be seen in very large ears, in ears which protrude at right angles from the head, and in those which are not involuted. These stigmata are more common in women than in men, which explains the fashion of covering the ears with the hair which is almost constant with the fair sex.

The external ear is an important index of health. Its colour should in no wise differ from that of the rest of the body. It is, in common with all parts of the head, not infrequently held in a state of chronic congestion by the undue constriction of the collar or the neck-band, but even when such purely mechanical causes are not in question, the external ear is often deep red or purple, in comparison to the rest of the surface. The meaning of this is usually a chronic error in metabolism most commonly dependent

upon intestinal stasis. Whenever it is observed it merits serious attention.

The ear is the organ of Fear, and Fear rules the world. If a person standing on Westminster Bridge contemplating the Victoria Tower were to see it suddenly and noiselessly collapse, he would be surprised, but he would not be afraid. If, however, the sudden collapse were attended, as it would be, by a deafening noise, his surprise would be swallowed up in terror. All animals are more easily frightened through the medium of their ears than in any other way. Man has inherited this sensitiveness for his nervous system generally is more readily affected through his organ of hearing than through his vision or his smell. An unexpected noise, especially if it be an unfamiliar one, will cause him to start. A noise will awaken him from his deepest sleep. In the presence of unfamiliar noises he cannot rest; and the noises arising in the ears themselves which trouble certain sufferers from deafness are sometimes so intolerable as to drive their victims to suicide.

It is an unfortunate fact that all the material advances in civilisation are accompanied

by an increase in noise. Setting aside the din of factories and of machinery generally, such blessings as are conferred upon us by telephones, motor-cars, aeroplanes and tube railways are seriously mitigated by the great increase of noise which they entail. It is probable that we are able in some subtle unconscious manner to distinguish between necessary noises and those which are unnecessary, and that it is the latter only which get on our nerves, as the saying is. It is certainly true that unnecessary noises are more wearing to the nervous system generally, than those which are recognised as inevitable. A continuous noise, however necessary and inevitable, is nevertheless very tiring. The fatigue, for example, of a long railway journey is undoubtedly due more to the noise than to any other cause. At least one medical friend of mine puts cotton-wool in his ears as soon as he starts on a long journey, an expedient which he finds very definitely to lessen the weariness. Incidentally it enables him to plead deafness to his loquacious fellow-passengers. It is therefore obvious that noise, whether or not it causes conscious irritation, has in the long run an exhausting effect upon the

central nervous system. Sleep in a railway train is not a refreshing sleep. The practical outcome of these considerations is that a certain amount of quiet is necessary to every one, every day. In its absence the nervous system fails to obtain the real repose which is essential to its ultimate well-being. If curtain lectures and other domestic amenities render this freedom difficult of attainment at home, the victim should join a club or institution in which there is a silence-room provided with deep arm-chairs.

Nature's method of ensuring quiet is by means of sleep. The physiology of sleep is not fully understood, but it seems evident that it is brought about by cutting off the blood supply to the brain. It also seems evident that the mechanism by which the cutting off is effected, includes something in the nature of a stop-cock, so suddenly does one pass from consciousness to unconsciousness. There is a very intimate relationship between food and sleep. It is said that sleep is more necessary than food because animals die more quickly from sleeplessness than they do from starvation. The real explanation of this is that when they are deprived of sleep they are at the same

time being deprived not necessarily of food, but of the sustenance which food is intended to supply. It is during sleep, and then only, that the nutritive material gathered into the blood is delivered to the expectant tissues. If there is no sleep there is no delivery, so that starvation is added to insomnia. It is no wonder the animal dies, for under such conditions he cannot call even on his reserves. This explains why it is that a really hungry man always sleeps well —too well. He is anxious to get at his reserves (of which he usually has a super-abundance) and realises instinctively that he can only utilise those reserves during sleep, so he drops off whenever he can. This simple phenomenon is such an unusual experience with modern man that he mis-interprets it, and translates his somnolence into terms of "exhaustion from want of food." [1]

The amount of sleep actually necessary to any particular person is an individual

[1] The relationship between sleep and the utilisation of food has not been adequately appreciated even by the Profession. It was made clear by the work of Dr. George Oliver, published in the *Lancet*, 1904, Vol. I, and quoted by Sir Hermann Weber.

matter which varies within very wide limits. It may, however, be safely affirmed that just as the majority eat too much, so the majority sleep too much. Too much sleep means that the brain is insufficiently exercised, which is just as bad for the mental side of man as insufficient muscular exercise is for the bodily side. In any case an occasional relative diminution in the usual amount of sleep does no one any harm; indeed, like fasting, it may do a great deal of good. And just as the majority of people hold to very exalted standards as to the amount of food they require, so do they nourish a very special solicitude on the subject of the quantity of sleep they require. And the curious and almost ludicrous fact is that the two, excessive food and excessive sleep, are mutually exclusive. The economy knows, though the individual does not, that the best means of putting up a barrage against excessive food is to deprive the feeder of his sleep, ensuring by this means that the tissues are not overloaded with useless nutritive material. For although such a person is somnolent during the day owing to the determination of blood from his brain to his stomach, he is unable to sleep at night

because a provident Nature sees danger in allowing him to do so. The person who is "a martyr to insomnia," in eight cases out of ten is a person who is in reality a martyr to his own gluttony. If he were to sleep as he thinks he has a right to do, he would be undone by a rush of nutritive substances to a system already overburdened with useless material. There would be a turmoil followed by an explosion; that way, apoplexy lies. The best sleeping draught is an emetic.

A few nights of less than the accustomed amount of sleep plunges such people into the depths of self-pitying melancholia. They approach each successive night with the full stomach and clenched teeth of an expectation which will certainly be realised, whereas the proper attitude is presented by an empty stomach and a careless mien. For sleep is a coy maiden who will successfully flee you so long as you continue to court her armed cap-à-pie; whereas if you let it appear that she is quite indifferent to you, and proceed to busy yourself with other matters, she will throw herself, vanquished, into your languorous embrace. The determination to obtain sleep by tossing and

turning, by praying and cursing, is to set in operation the "law of reversed effort" already referred to in the Mental section. By a clenched fist endeavour to conquer sleep you are suggesting to yourself that you will not succeed, whereas if you quietly assume that you are going to sleep, and transfer your thoughts to other matters, you are far more likely to succeed. The other matters, in a tangible form, should be on a table beside your bed, in the shape of one or two volumes of congenial and serious literature. The mere fact of their being there, is a sort of insurance against their being required.

By the foregoing I must not be understood to suggest that overfeeding, especially nocturnal overfeeding, is the sole cause of insomnia, for I realise that the causes of this troublesome condition are many, and that some of them are simple while others are subtle. Among the latter are worry and anxiety, poisons such as tobacco and alcohol; they are subtle because they act so differently upon different individuals, small quantities provoking insomnia in some, while relatively large quantities produce no effects upon others. The elucida-

tion of the problems they present is the task of a physician, who can only form an opinion when all the facts of an individual case are placed before him. Among the simple causes are the mental atmosphere which prevails at bedtime, the posture adopted in bed, and the amount of bedclothes. Many people work at night, and are liable to take the details of that work to bed with them. Now no serious worker finds his task a pastime, however congenial that task may be, so that it is a good thing for a man to change the current of his thoughts before actually retiring, by taking up a book on a totally different subject, by reading the daily paper, or what not. Twenty minutes or half an hour devoted to that kind of diversion is well spent. A change of work is as good as a holiday.

If you will visit a nursery or a children's ward in a hospital when the occupants are all asleep, you will find that, almost without exception, they are lying on their faces. If, as a matter of experiment, you turn some of them on their sides, you will find that in a very short time they will wriggle round into their original seemingly uncomfortable positions. This position evidently serves

some useful purposes, one of which I have found to be an improved circulation in the feet, a fact of which anyone may satisfy himself. People who work at night generally go to bed with cold feet, and cold feet is a recognised cause of insomnia. To remedy this, night socks and hot bottles are resorted to, both of which are efficacious and harmless. But neither can compare with the ventral decubitus, as it is called, the position namely which is habitually adopted by children. The habit of this position is not an easy one for adults to acquire, but a very little practice renders it tolerable, and anyone taking to it will be surprised at the rapidity with which on the coldest night his feet will become warm enough to allow him to sleep.

Another posture which seems to be conducive of sleep is that of lying on the side with the knees well drawn up. The success of this, like that of the ventral decubitus, is probably susceptible of a simple physiological explanation into which it is unnecessary to enter here. It is said that one ought to lie on the right side, because the heart is on the left. There is not the slightest danger to be feared for the heart by lying

on the left side, but inasmuch as its beats are generally more audible when lying on the left side than on the right, and as the sounds may tend to keep nervous people awake, the right-sided decubitus may in a general way be regarded as the better of the two. Against this, however, is to be set the fact that lying on the left side helps to expel gas from the stomach, and gas in the stomach is very provocative of insomnia. That there is something in the question of posture as it affects sleep is further seen in the fact that the dorsal decubitus (lying on the back) is liable to produce nightmare in a certain number of people.

A very common cause of sleeplessness and nightmare is a superabundance of bed-clothes. This, in the case of children, is certainly the most common of all causes—and the most reprehensible. For some reason hitherto unexplained, the heat regulating mechanism of the skin seems to be in some way interfered with during sleep. In sleep, as in fevers, the normal relief of perspiration does not occur in the same automatic manner as it does, say, during muscular exercise, with the result of disturbance to the nervous system which is often severe. Extremes of

temperature are both inimical to sleep. When you are cold the vessels in the skin are unable to dilate sufficiently to allow of the accommodation of the blood which must leave the brain before sleep is possible. When you are too hot in bed there is a disturbance of the nervous system which prevents real sleep, for although there may be unconsciousness of a fitful kind, usually accompanied by nightmare, there is no real sleep. And yet heat during the day seems to promote sleep. The difference probably resides in the fact that the skin is a respiratory organ and that it is unable to exercise this function when it is smothered by an excess of bedclothes. Nothing is so conducive to bad nights and irritable days as the over-burdening of the body with too many and over-heavy bedclothes. If more attention were paid to the respiratory function of the skin there would be less breathlessness by day, and more sleep at night.

Another cause of sleeplessness, which though less common than it used to be, is still much too common, is an unsufficiently ventilated bedroom. When we realise that eight hours out of the twenty-four—in

children the proportion is greater—are spent in the bedroom, the necessity for a very free circulation of air therein ought not to require any insistence. The stuffy idea beloved of our forefathers that night air contains some subtle alembic something, which renders it more poisonous than prussic acid, is a vulgar and stupid falsity which, for the most part, represents the exact reverse of the truth. In large towns, at any rate, night air is more free from impurities than day air. Cold air is no more injurious than cold water, especially if it be inhaled through the nose and not through the mouth. Neither is there any harm in the moisture with which night air is falsely supposed to be lethally loaded. The very people who are loudest in their condemnation of damp air are the very first to make an appeal to the bronchitis kettle, whose sole virtue is that it increases the moisture in the atmosphere.

Of means of avoiding simple insomnia I have already referred to two, namely a mind which has been diverted from the groove of the daily toil by some light literature, and a body which has been placed in a posture favourable to sleep. There remains a third,

which is nowadays open to most people, namely a hot bath. The warm water has the effect of withdrawing the blood from the brain, thus furnishing one of the chief essentials of sound sleep. Of opiates, soporifics, hypnotics, *et id genus omne*, I have only to say that they are abominations of the very worst kind, which should be resorted to only on the advice of a physician, and not perhaps always even then. Some young doctors in their anxiety to give relief, are rather too apt to believe in the claims put forward in favour of drugs which they see advertised in the medical journals, and are able to persuade themselves that such and such drugs produce refreshing sleep without any ill-effects whatever. There are no such drugs: they have never existed and never can exist. The least harmful is an alcoholic night-cap; but the combination of an empty stomach, a hot bath and a well-ventilated bedroom should render even that unnecessary.

Care should be taken to keep the orifices of the ears clean and dry. Wax is a perfectly normal secretion which varies in amount according to circumstances. There is, for example, more of it when conditions

favour perspiration from the skin. Soap and water carefully applied by the little finger daily should be sufficient to remove any excess, after which the orifice should be carefully dried. If more attention were paid to the ears by cleansing and drying and massage, fewer people would grow deaf as they grow old. Like every other part of the body, the ears require regular stimulation.

The Mouth

Physiologically the mouth is the gateway both to salvation and to damnation: more often, unfortunately, the latter than the former. If the portcullis would but fall as soon as the citadel was full, there would be less strain on the masonry. The most conspicuous feature in the mouth is presented by the teeth, to whose ministrations all food is immediately subjected on arrival. It is obvious to the most superficial that if the teeth be decayed, then the decaying matter will inevitably become mixed with the food and find its way into the stomach and intestines, which in their turn become poisoned and unwholesome. More-

over, bad teeth communicate their toxins to the gums, thus producing the popular conditions known as pyorrhœa. Now it is pertinent to enquire at the outset how it happens that whereas the lower animals never suffer from caries and pyorrhœa, civilised man does so in ever-increasing measure. The answer has already been indicated: it is that of all animals, man is the only one who is unable to select his food. If man lived on the foods which Nature intended him to consume, there would be no decay and no pyorrhœa. The races nearest the lower animals, i.e. the Maoris and the Esquimaux, are to all intents and purposes immune from dental decay. An examination into their dietaries show that they consume for the most part natural foods, and that these foods are innocent of any culinary preparation.

Regarded from a purely dental point of view, the foods of the primitive races, though exhibiting considerable differences in many respects, have one point in common, which is that they all promote a very free flow of saliva. The importance of the saliva is not generally recognised. It is usually regarded as a fluid which, in virtue of a ferment which

it contains, prepares the ingested food for the elaborate processes to which it will have to be subjected in its passage along the gastro-intestinal tract. That is a very important function of saliva which should in no case be lost sight of; but, important as it is, it is secondary to the duty of cleansing the teeth, for which the saliva is specially and constitutionally equipped. There are three pairs of salivary glands in the mouth; the one pair, the parotids, supplies the upper jaw, the other two, the sub-maxillary and sublingual, supply the lower, on each side. The amount of saliva which is poured into the mouth by these glands may amount to several pints in the twenty-four hours. It is always being secreted, night and day, but there is of course a special flush as soon as food is placed in the mouth. It is instructive to note that certain substances increase the flow of this beneficent fluid, whilst others depress it. Among the most powerful depressants are bread and butter, tea, tannic acid and meat. The most powerful stimulators of the salivary secretion are acid foods, such as fruits and salads. The proper care of the teeth thus resolves itself into a question of a suitable

dietary, and, as one would expect, the fact which emerges most prominently is that the substances which are most suitable to the preservation of the teeth are the natural foods which have undergone the least artificial preparation, and have therefore retained their vitamines: the foods in fact which are most suitable to the preservation of the general health.

The obstinate wrong-headedness of the majority of people on the subject of food is nowhere better exemplified than in the prevailing firm belief that acid foods are harmful. This is probably an aftermath of the exploded uric acid theory, which attributed all mistakes in dietetics to the presence of this perfectly harmless material and the supposition that anything which was acid was of the nature of uric acid, and therefore to be avoided. However that may be, the most recent researches on the question of dental decay and pyorrhœa show most conclusively that so far from being inimical to health, natural vegetable acids as they occur in raw fruits, raw vegetables, and other natural foods, are among the most beneficial and health promoting substances which can be introduced into the

human economy. The best tooth paste is a fresh apple or a raw orange; the best mouth wash is a solution of common salt or one of citric acid. It is necessary to distinguish between acid foods and acid-forming foods. The acid foods are the natural foods, fruits and vegetables: the acid-forming foods are the unnatural foods, meats, artificial sugars, refined and concentrated foods of all kinds. These foods tend to cause the condition known as acidosis, which is the underlying and generally unsuspected cause of much of the *malaise* and misery which prevails among civilised peoples.

Under this head it seems fair to say a word in favour of two substances about the use of which much controversy has raged in the past, namely wines and tobacco. The effect of both these substances taken in reasonable moderation, is definitely to promote the flow of saliva. It is obvious therefore that wines taken with meals aid digestion and promote the cleansing of the mouth; and that tobacco, smoked after meals, keeps up the flow for some time after the flush provoked by the meal itself would otherwise have subsided. It thus helps to purge the

mouth of a considerable quantity of detrimental debris. Another advantage attaching to smoking is the now generally admitted fact that tobacco smoke, especially the smoke of cigars and the better class tobaccos as smoked in pipes, has a very definite antiseptic action upon the enemy microbes which are liable to be introduced into the mouth by food.

The very worst kinds of food are those which are nowadays habitually and generally consumed in large quantities by almost every member of the community. These are the sticky foods, as represented by starches and sugars. At breakfast they are present as sugar added to tea or coffee; as bread biscuits and marmalade. At luncheon they appear in milk puddings and jam rolls. At afternoon tea there is a perfect orgy of them; they riot in bread and butter, cakes, scones and buns. At dinner they come as tarts, either of the fruit or the jam variety, with a liberal allowance of bread between the courses. The intervals between these ascetic repasts are frequently relieved by chocolates, lollipops and various other kinds of sweets. It is a curious thing, but the consumption of these foods seems to beget

in their consumers a very special mental attitude of almost ostentatious self-complacency. I know of nothing to which I can compare the smirking assumption of moral superiority usually adopted by a woman who sits down to preside over a tea-table, which groans beneath the weight of all the sticky toxins which the ingenuity of the pastry-cook can devise. Nothing could be less justifiable. Ruggieri, Catherine de Medici's famous poisoner, could scarcely have devised a repast more suitable to his sinister purposes.

The two curses of modern dietaries are cookery and concentration. Cookery, the damning dissipator of vitamines, has already been dealt with ; the crime of concentration is well exemplified by a consideration of sugar. Sugar, as we know it, is a concentration of the sweet substance found in the sugar-cane. The degree of this concentration may be gauged from the fact that it requires twenty sticks of sugar-cane to make one pound of loaf sugar. This means that an ordinary lump of sugar is equal to about two feet of sugar-cane. Children in these islands therefore eat the equivalent of four yards of sugar-cane in a few minutes, and

the amount of sugar dissolved in an ordinary cup of tea or coffee represents about six feet of the article supplied by Nature. Now sugar as found in the cane itself is associated with other substances which are caused completely to disappear by the refining process, and it is these "other substances" which render the sugar suitable and tolerable to the human economy, exactly in the same way that the presence of vitamines renders natural food suitable and tolerable to the human economy. An indication that Nature never intended us to use sugar in this concentrated form is afforded by the fact that the variety of sugar called fructose, which provides the sweet element in all fruits, except grapes, is so combined with the other "substances" that it cannot be extracted, crystallised and refined. Another point of great significance is that cane sugar is of itself highly indigestible; before it can be utilised by the economy it must be converted into fructose. When this conversion has to be effected on a large scale it means an enormous expenditure of unnecessary energy. And the scale in these days is very large; for it is computed that each person in this country consumes between

ninety and a hundred pounds of artificial sugar per annum; a quantity which represents the excess over the moderate amount designed by Nature for our use. That amount may be estimated from the fact that our sweetest fruits contain a surprisingly small amount of sugar, and this is the form of the easily digested fructose. Thus, cherries contain 10 per cent., apples, pears, oranges and apricots, 8 per cent., raspberries, 7 per cent., and strawberries, 5 per cent. Even the subtropical grapes and pineapples contain, the former no more than 17 per cent and the latter 13 per cent. What more powerful indictment than these facts supply, would it be possible to bring against the present-day practices in the matter of sugar?

But there is a lower deep. Between sugar and alcohol there is not only a very close chemical affinity, but the action of the one on the human body is very similar to that of the other. Both are sedatives, and in large doses, both are irritants. One of the effects of the present day fashion of surfeiting children with sugar is to create a craving for alcohol in the adult. The saccharine sedative grows by what it feeds

on, and is later replaced by the more powerful and more easily digested alcoholic sedative. This is a very serious matter, to which parents should pay more attention than they do at present. Sugar is regarded as a harmless wholesome nutritious substance which may be given to children in any quantity with perfect impunity. It is nothing of the sort; it is, on the contrary, an article of diet which, except in its natural forms, is calculated to ruin the teeth and upset the digestion, and to bring in its ultimate train the disasters of diabetes and alcoholic excess. If you care to realise a part of the mischief—and it would be a part only—which is wrought by excessive consumption of artificially refined sugar, examine the mouth and tongue of the consumer, and figure to yourself that his stomach is in exactly the same state of disgusting disorder.

The truth is, all concentrated foods are an abomination. The digestive organs of the genus homo are not constructed for the disposal of foods in tabloid form. These artificialities, by which the arrogance of man attempts to better the intentions of Nature, bring nothing but trouble in their

contemptible train. The only natural concentrated food is milk, and even that, except in small quantities in tea and coffee, should find no place in the ordinary dietary of healthy adults. Milk puddings, being devitalised concentrations of milk, starch and sugar, are as unscientific a form of food as it would be possible to imagine. But by far the most futile and senseless attempt at concentration which pseudo-scientists have attempted, is represented by beef-tea and its congeners. These substances not only contain no vitamines and no proximate principles, nothing in fact which is of the slightest nutritive value, direct or indirect, but they do contain most of the waste products of the animal muscles. As Professor Bartholow puts it, beef-tea is more an excrementitious substance than a food. Nature intended us to take our food diluted with ballast, our corn mixed with hay, and any attempt to evade or improve upon this design, invariably and deservedly meets with disaster. The human stomach is not a test-tube.

The idea which originally underlay the making of beef-tea and its congeners was probably the belief that meat foods were so

valuable that if you could compress a bullock into a teacup there would result a veritable elixir of life. The attempt at condensation proved to be a fantastic failure, but the failure is certainly less disastrous to the health of the community than success would have been. For the truth is, meat foods in their ordinary forms are not only totally unnecessary to the ordinary person, but their habitual consumption, (which is the same thing as their excessive consumption) is the very worst dietetic crime which civilised man can commit. It is the fashion with certain people to point to man's canine teeth as evidence that he was intended to be a flesh eater. The teeth were certainly provided for the purpose of tearing flesh, but it was not dead flesh that they were intended to tear, but living flesh. The canine teeth were provided for fighting purposes, a fact which is obvious when it is realised that they are much longer and more powerful in the male than in the female. Moreover, if we are to assume that flesh did really enter into the diet of primeval hunting man—and it seems reasonable to do so—then we must reconstruct the whole picture. To do this is to bring two essential

facts into the foreground. The first is that the flesh was eaten in its raw state—as the Esquimaux still eat it; the second, that after eating his meal of raw flesh, the primeval ancestor fasted from flesh foods for several days; until his next hunting expedition, in fact. Contrast this picture with the meat-eater of to-day. He does not hunt his flesh foods, and therefore fails to justify their consumption by continual vigorous exercise in a semi-fasting state. He does not abstain from meat for several days, and instead of eating it raw, he eats it cooked, and devitalised. He consumes cooked animal food for breakfast, cooked animal food for luncheon, cooked animal food for dinner, and he fills up the interstices with sticky cooked and concentrated starches and sugars; which ungodly agglomeration of artificial intoxicants he washes down with stimulants in the form of tea, coffee and alcohol. He takes very little exercise, and he never fasts. Is it any wonder that "half the world is ill, and the other half has something the matter with it?"

To those who take the trouble to examine the evidence, it is abundantly clear that

in the habitual dietary of present-day man, there is no justification for butchers' meat foods. The best that can be said for them is that they are stimulating luxuries which may be permitted to the weaker brethren as occasional indulgences. To consider them, as they are almost universally considered, as necessaries to continued physical efficiency, even to the continuance of life itself, is perversely and obstinately to embrace a falsity which is fraught with every kind of physical disaster. It might be possible to offer some justification for butchers' meat consumed in its raw state, because in the raw state it still retains its vitamines. At best, however, its vitamines content is mediocre, for all the vitamines come from vegetable sources, and it is consequently only those vitamines which the animal has failed to utilise which are present in its dead tissues. And, side by side with this meagre vitamine content, there exist all manner of animal poisons which more than counterbalance such advantages as the exiguous vitamines may have to offer.

And, be it remembered, these poisons are carefully cultivated in the animal during its lifetime. A large number of these unfor-

tunate beasts are subjected to a long process of artificial preparation for the toxic task which they are predestined to perform. To begin with, they are castrated, which means that the balance of their endocrine glands is upset. excretion is interfered with, and fatty deposits are encouraged. The general unhealthiness thus begun is further promoted by enforced idleness and over-feeding. The complete article is an animal so obese that it can scarcely move, with all its organs, especially the liver, superladen with fat, and its blood brimming over with undischarged poisons. This means that the products of tissue change, which tend to accumulate in all animals, are in this case carefully and cunningly conserved, so that when it is "fit to kill," the unfortunate beast is as full of toxins as a plum pudding is full of raisins. The only bright spot in this unlovely picture is that the animal is really killed—and put out of its misery. Sentimental busybodies talk of the cruelties of vivisection, the operations of which are always performed under an anæsthetic. Such well-meaning people would be better employed if they turned their sobbing solicitude to the unfortunate animals who, after

being mutilated without an anæsthetic, are condemned to spend their lives in the tribulation of toxic obesity in order that human beings may become gouty, cancerous, and cantankerous.

As soon as this mass of flesh, steeped in its living toxins, is killed, it immediately proceeds to take unto itself four and forty other toxins, namely, the toxins of decomposition and putrefaction. These are at once accorded a hearty welcome in the diseased tissues. When animals die, they immediately begin to decompose. Every one is aware of this, and yet until the decomposition has reached the point of blatant putrefaction people are unable to realise that it exists. If they were to picture to themselves, as very little imagination would enable them to do, that the masses of flesh which they see exposed to view in butchers' shops, are in an active state of decomposition, it is hard to believe that they would pay large sums of money for the privilege of poisoning themselves therewith. It is no doubt true that the culinary processes to which meat is usually subjected before it is eaten, are sufficient to destroy the germs which inevitably accumulate on the surface

of meat exposed to the dust of streets; but it is very doubtful whether any culinary process, save one which completely destroys all flavour and all nourishment, is sufficient to nullify the poisons of decomposition. Nothing, certainly, can possibly do away with the poisons which have accumulated in the tissues of the fatted beast before it is sacrificed.

The gravamen of the charge against butchers' meat rests on the fact that the beasts from which it is derived are in an artificially induced state of fatty degeneration, that is, of serious ill-health, before they are killed. For this reason, if for no other, it is easy to draw a definite line of demarcation between butchers' meat on the one hand, and fish and game on the other. The two latter seem in many ways to be natural foods. It is at any rate certain that they do not produce the same deleterious results as meat. Birds and fishes have been leading healthy lives up to the moment they are killed, and there can be no doubt that, eaten on the day on which they are killed, that is, when post-mortem decomposition is at its minimum, they do very little harm to healthy, active people. Poultry may

be regarded as midway between the two. These birds are artificially fatted to some extent, but to a less extent than beasts, and their essential poisons are probably less poisonous than those of beasts; but at the moment of death they are probably not as healthy as game and fish. When eaten soon after they have been killed, they are, certainly occasionally, a permissible form of food.

It is an extraordinary thing that people, who are otherwise wholesome and clean living, should train themselves to enjoy eating game and venison and other foods which are admittedly putrescent. Yet these same people are the first to cry aloud with horror at an egg which has lost its pristine freshness.

As I have now placed the ordinary forms of food, meats, sugars, and starches, in an index expurgatorius, I might reasonably be asked what forms of food, outside the index, can be considered as at once suitable to human consumption and adequate to the primary and essential work of repair upon which the maintenance of life depends. In reply to this, I would repeat that the foods in the index are artificial foods, and that the

proper foods are Nature's foods. The artificial foods, being cooked, contain essentially no vitamines, and incidentally many and grievous poisons; whereas Nature's foods contain an abundance of all the vitamines and no poisons. Now, what are the natural foods? Natural foods are represented by dairy produce, uncooked vegetables, and uncooked fruits. Admitted into the category, but not as full members, are suitably cooked vegetables, dried fruits, bread, biscuits. Game, fish, and poultry are included under a mild protest, for it must be admitted that whatever may be said against these on some grounds, the liver of birds and the roe of fishes contain valuable elements, even when cooked. Oysters, when taken raw, may claim full membership; cooked shell fish, honorary membership only. Out of such a list it should be easy for the most exacting person to frame a scheme of living entirely satisfactory both to his physiological needs and his æsthetic requirements. I should explain that "dairy produce" includes everything which a dairyman sells: milk, cream, butter, cheese, eggs, honey; that "uncooked vegetables" include a great many things which are not usually put into

salads, such as carrots, turnips, dandelion leaves, nasturtium leaves, sorrel, thyme, cabbage, horse-radish and cauliflower. Such vegetables are usually cooked, and people often express astonishment at the suggestion that they can be eaten raw. Not only can they be taken raw, but they can be so taken with great advantage, for they are far more palatable in that state than when they have been cooked. Moreover, one is apt to tire of the ordinary salads, chiefly because no ingenuity is exercised in procuring and providing a variety. The heart of a lettuce with a slice of tomato and two slices of cucumber, perchance flavoured with a morsel of spring onion, is the form in which an appeal for a salad usually materialises at a restaurant in this country. More often it does not materialise at all. The very moderate request for endive, chicory, water-cress, celery, or radish, in addition, always provokes an attitude of pained surprise at so unreasonable a demand. In addition to varying the ingredients, frequent changes may be made in the matter of flavouring, for there is no objection to the use of condiments and dressings. Of cooked vegetables, spinach, beans, greens, peas, and brussels

sprouts may be used, provided that in the cooking no bicarbonate of soda be used. This is generally added by cooks because it enhances the green colour, and thus improves the appearance of the vegetable. There is no doubt about its action in this direction; unfortunately, however, it completely destroys the vitamines. Leeks and onions may be taken cooked in the ordinary way. Potatoes should be cooked in their skins.

Fresh fruits, which are *par excellence* Nature's foods, should form a large element in every meal. There is no difficulty in finding a variety even in winter, because oranges, bananas, apples, and other fruits are largely imported into this country. It is difficult to understand how the prejudice against raw fruits and salads originally arose, for it is a demonstrable fact that they are not only in themselves readily digestible, but that they promote the digestibility of other substances taken at the same meal. The probability is that the "acid bogy" is primarily responsible. Fresh fruits should take the place which puddings now unfortunately occupy in the ordinary dietary. They contain sugar in a readily digestible

form—it is indeed the only digestible form—and mixed with cream they supply the palate with all that puddings can properly be expected to supply. In fruit salads and in fruit tarts (occasional indulgence in which is harmless enough) it is better to avoid the added sugar.

Except in small quantities in coffee, tea and salad dressings, milk is not a desirable form of food for an adult. In the form of junket and other curded dishes it is, however, wholly unobjectionable. Eggs may be taken raw in a salad dressing, or poached with other foods. The longer an egg is boiled, the more surely are the vitamines destroyed. If, on artistic grounds, it is desired to increase the sweetness of a dish, the added sweetness should be obtained from honey and not from ordinary sugar. The former is readily digestible, which the latter is not.

Breakfast should be of the continental type, that is, tea or coffee, toast and butter and some fresh fruit. Compared to the stupefying meal with which the ordinary Englishman considers it his bounden duty to begin the day, this may seem unduly meagre. But, apart from the fact that it is the rule among continental peoples, which is eloquent

as to its sufficiency, there is physiological warrant for the practice. We have seen in a previous section that food reaches its destination during sleep. In the morning the tissues are, therefore, so to speak, saturated with food, and all the available energy is required for the assimilation of this food and the voiding of waste products. The morning is essentially the period of excretion, and the gastro-intestinal canal should be given as little work as possible in order that energy may not be deflected from its legitimate channels. A glass of water on waking aids the metabolic work; anything over and above that tends to retard it. The method of breaking the fast above sketched is, however, especially for young people, perfectly legitimate, provided that it is realised that the less the food which is taken for breakfast, the better the morning's work.

Luncheon is usually taken at half-past one in this country. With a light breakfast, half an hour or even an hour earlier is more suitable, though the exact hour matters very little; it is purely a matter of habit. And, like breakfast, in comparison to the ponderous meal which the Englishman takes about midday—"to keep up his strength"

—luncheon should be relatively light. A salad, some toast and butter and cheese, and plenty of fresh fruit of all kinds, is quite sufficient for most people. If the "sweet tooth" becomes clamorous, then in addition to the above, some honey, or, under pressure, some jam, may be conceded, to go with the toast and butter. In winter, a cooked green vegetable, say spinach, with an egg, or an omelet *fines herbes*, may be looked upon with indulgence. This meal may profitably begin with a glass of water. Cold douches should not be restricted to the exterior of the body. Tea and coffee are both agreeable stimulants, but inasmuch as they both retard digestion, they are better avoided. Alcoholic drinks, even cider, if taken at all, should be reserved for the meal which is taken when the day's work is done—"No drinks before dinner."

Of the meal called afternoon tea it is difficult to write in terms of suitable restraint. The assemblage of concentrated indigestibles which is ingurgitated into the rebellious and still partially distended stomach at this wholly unnecessary meal, represents a waste of energy, material and money for which no excuse can possibly be found. The

French, who lunch earlier than we do, never take it; thrift, and respect for the evening meal, combine to keep them in the paths of wisdom. People will sometimes assert that if they don't have tea they suffer from a "sinking feeling" in the pit of the stomach. This is quite likely, because the feeling of which they complain, and attribute to hunger, is in reality a form of indigestion, for which the proper treatment is not tea, but muscular exercise. Moreover, if anyone should really want food at that hour, which, after a suitable luncheon, he ought not to do, then the proper means of assuaging his hunger is an apple or an orange. In reality, however, the whole fashion of a meal of any sort between luncheon and dinner is nothing short of grotesque gormandising which it is impossible to condemn too severely.

It is found by the majority of people that it is best to defer "the meal of the day" to an hour when it may be taken untrammelled by business calls and worries. And this plan is entirely in accordance with physiological principles. Leisure to eat slowly, and a mind free from the pressure of engagements, especially if these can be accompanied

by congenial companionship, constitute the most suitable atmosphere for appetite, digestion, and assimilation. From among the suitable foods which have already been enumerated or indicated, it ought not to be difficult even for a gourmet to frame a menu which would be entirely satisfactory to the most exacting diner. Fish and a salad; bird with a green vegetable, toast, cheese, and fruit, varied with some of the etceteras, such as chicken's liver and cod's roe, already mentioned, ought to find a ready acceptance in any company. It is not that I regard these etceteras as in any degree necessary. I cite them merely to show that a rational diet is in no sense synonymous with a starvation diet. For the majority of people much simpler fare will suffice. Provided that the meal rigidly excludes butchers' meat, puddings, cakes, and other sweets, and generously includes uncooked salads and uncooked fruits, with a suitable quantity of dairy produce, there is a wide choice for the remainder. This applies to healthy people who wish to keep fit. Unhealthy people who want to get well are in a different category.

It is a good general rule which bids us to

eat sparingly of the things that we enjoy. An elderly physician of my acquaintance who retained his mental and physical efficiency up to a very advanced age attributed his good health to the fact that he rose from every meal feeling that he could sit down and eat it all over again. That, no doubt, is a counsel too near perfection for general application to the young and vigorous, but it contains more virtue and much more common sense than the Victorian trencherman's pious practice of eating as much as he possibly could. He constricted his neck with white chokers, and choked his stomach with red meats. It is no wonder that he was a hypocrite.

In the matter of beverages, dogmatism would seem to be out of place; it certainly would be unlikely to affect the practice of anyone who reads this book. Tea and coffee are both of them agreeable stimulants against which, when used in moderation, it would be impossible to urge any serious objection. In this country coffee is seldom taken to excess, but excessive tea-drinking is very common. To use the term in its proper sense, tea is an intoxicant whose excessive use is fraught with a great many

evils. Unfortunately those evils are not easily recognisable, and when they are recognised they are seldom attributed to their true cause. They include dyspepsia, constipation, emaciation, and such a general lowering of the physiological powers of resistance as to render the victim an easy prey to the onslaught of diseases of every kind. Excessive tea-drinking is not very common among the educated classes, but among the women of the lower classes it is a serious vice which the legislature does nothing to discourage.

To the ceaseless controversy on the subject of alcoholic drinks, I do not pretend to have anything fresh to contribute, but I must repeat my profound conviction that when the worst has been said against these beverages, the harm which they impose upon the health of the community is as nothing compared to the disasters attendant upon meat-eating and sugar-sucking. Alcoholic excess is unquestionably on the decline, whereas meat-eating and sugar-sucking are seriously on the increase. Moreover, a person does not begin to drink alcohol at all until he is physiologically mature, when his powers of resistance and adaptation are

nearing their zenith, while anything in the nature of deleterious excess comes much later. In the case of meat-eating and sugar-sucking the vice is begun in infancy, often before the child can either speak or walk, so that these devastating poisons begin their sinister strength-sapping work in the earliest sapling stage. In red meats and sweet-meats, far more than in alcoholic drinks, are to be sought the causes of that national degeneracy which every one deplores.

That alcoholic drinks taken in moderation have many physiological merits is beyond all dispute. Matthew Arnold well stated the purely human and social aspect of the matter when he said "wine used in moderation seems to add to the agreeableness of life—for adults, at any rate,—and whatever adds to the agreeableness of life adds to its resources and its power." Physiologically, alcohol is a readily utilisable food. It is scientifically more correct to describe it as a "food-sparer," but that is, here, at any rate, an unnecessary purism. Alcohol is absorbed into the blood practically as it is taken, that is to say, no energy is required to convert it into an assimilable form. All

authorities are agreed that in moderate doses, good wine has a favourable effect upon digestion. It increases the flow both of the saliva and of gastric juice, thus rendering valuable aid to the utilisation of other foods. It must, however, be admitted that it has a lessening effect upon the output of muscular power, and is not conducive to the best kind of concentrated brain work. All of which means that in ordinary circumstances its use should be reserved for the evening meal, when the day's work is done. Taken in moderation at such a time, and taken with the meal, it does no harm, and may do a great deal of good. The effect of alcohol varies very much with the individual. People with a gouty inheritance often bear it badly, even in small quantities. In such people it may cause, among other things, dyspepsia, eczema, and huskiness of the voice. Heavy wines are more likely to produce such symptoms than beers and spirits. There seems to be something in climate which determines the suitability or otherwise of a particular kind of alcoholic beverage to an individual. Beer, cider and whisky seem to be physiologically most congenial to the inhabitants of these islands,

while the Latin races seem to fare better on wines. As a medicine, nothing can compare to well-matured brandy.

The digestive organs, like the body as a whole, have need of certain periods of rest. In the modern scheme of things, these organs, so far from being permitted to rest, are driven full steam ahead for the full twenty-four hours, and in most cases the safety valves are wadded round and about with adipose tissue. In the foregoing pages I have endeavoured to expose the follies and dangers of thus treating the human machine, and have ventured to point out a better and a purer way. In several places I have alluded to the benefits to be obtained from occasional fasts, and with a further reference to the matter I will bring my admonitions to a close.

By fasting, I mean complete abstinence from everything except water during the specified period. To obtain the maximum benefit from this discipline, lest absorption of deleterious matters should take place from the intestines, the fast should be preceded by purgation. A dose of grey powder at night, followed by a dose of Epsom salts the following morning, will do all that is

necessary. As soon as the desired result is obtained the fast begins. The length of its duration depends upon many considerations, into which it is impossible to enter here; suffice it to say that a moderate fast should extend over three full days. If the intestinal canal is really empty, the ordeal is by no means as fearsome as it seems, in anticipation, to be. On the first day there is a certain desire for food at the hours of the customary meals, but the desire soon passes, especially if mind or body, or both, are fully occupied. On the second day the desire for food is sensibly diminished, and on the third day one usually has no desire for food whatever. During this period of three days the faster must not pity himself. He must go about his usual business in the ordinary way and take moderate exercise. The process cannot be described as stimulating, but it is much less depressing than one might imagine. One feels well, but as a rule rather sleepy, and there is no reason why the desire for sleep should not be indulged. On the fourth day the fast is broken by a very small meal; say, two apples and a cup of tea or coffee. The two other meals of that day should also be very small, and

of the raw fruit variety. On the fifth day, the ordinary way of life is resumed, with a feeling of rejuvenation and added zest.

In the case of people over forty years of age who are obliged to lead sedentary lives, a fast of this kind may profitably be undertaken every three months. Some people prefer more frequent fasts of shorter duration, but my own experience is that the full benefit of abstinence is not forthcoming from a fast of less than three days' duration. The effect of fasting is to cause the organism to live on its reserves. The reserves, in the case of most people, consist of superfluous fat and a great deal of partially assimilated material. The individual is not starving in a physiological sense, because he is living on material which he has been unwittingly putting by for a rainy day. In ordinary modern conditions the rainy day never arrives, and the useless material goes on accumulating. It is therefore necessary to produce the rainy day artificially. When this is done, there is a sort of spring-cleaning of all the tissues, and the machine starts work with all its bearings freed from grit and the fires burning brightly. Fasting is a sensible, harmless, physiological and inex-

pensive method of keeping in good health; and one of the most potent means of redressing the balance when things go wrong. It is Nature's way.

Memento te animal esse.

Authorities

What is Man? By Prof. J. Arthur Thomson, M.A., LL.D. (Methuen.)

Food and the Principles of Dietetics. By Robert Hutchison, M.D. (Edward Arnold.)

The Prevention of Dental Caries and Oral Sepsis. By H. P. Pickerill, M.D. (Bailliere, Tindall & Cox.)

The Physiology of Muscular Exercise. By Prof. F. A. Bainbridge, M.D. (Longmans, Green.)

Human Physiology. By Prof. Luigi Luciani. (Macmillan & Co.)

Means for the Prolongation of Life. By Sir Hermann Weber, M.D. (Bale & Sons.)

Heliotherapy. By A. Rollier, M.D. (H. Frowde and Hodder & Stoughton.)

Facts relating to New Scientific Discoveries concerning Life-giving Foods. Compiled by C. Alma Baker, C.B.E. (Vale & Pearson, Ltd., Sydney.)

Vitamins and the Choice of Food. By Violet and R. H. Plumiiner. (Longmans.)

Aromatics and the Soul. By Dan Mackenzie, M.D. (Heineman.)

Physiological Principles in Treatment. By W.

Langdon Brown, M.D. (Bailliere, Tindall & Cox.)

Sunlight and Health. By C. W. Saleeby, M.D. (Nisbet.)

The City of Din. By Dan Mackenzie, M.D. (Adlard.)

Butchers' Meat and its Effects upon the Human Body. By Charles W. Forward. (Denny & Thomson, Ltd.)

The Gateway to Health. Edited by Charles E. Hecht, M.A. (The St. Catherine Press.)

The Action of Alcohol on Man. By Prof. E. H. Starling, F.R.S. (Longmans.)

Life: A Book for Elementary Students. By Prof. A. E. Shipley, F.R.S. (Cambridge Univ. Press.)

Sunshine and Open Air. By Professor Leonard Hill, F.R.S. (Edward Arnold & Co.)

Man's Mental Evolution. By Harry Campbell, M.D. (Bailliere, Tindall & Cox.)

Index

Printed in Great Britain by Butler & Tanner Ltd., *Frome and London*