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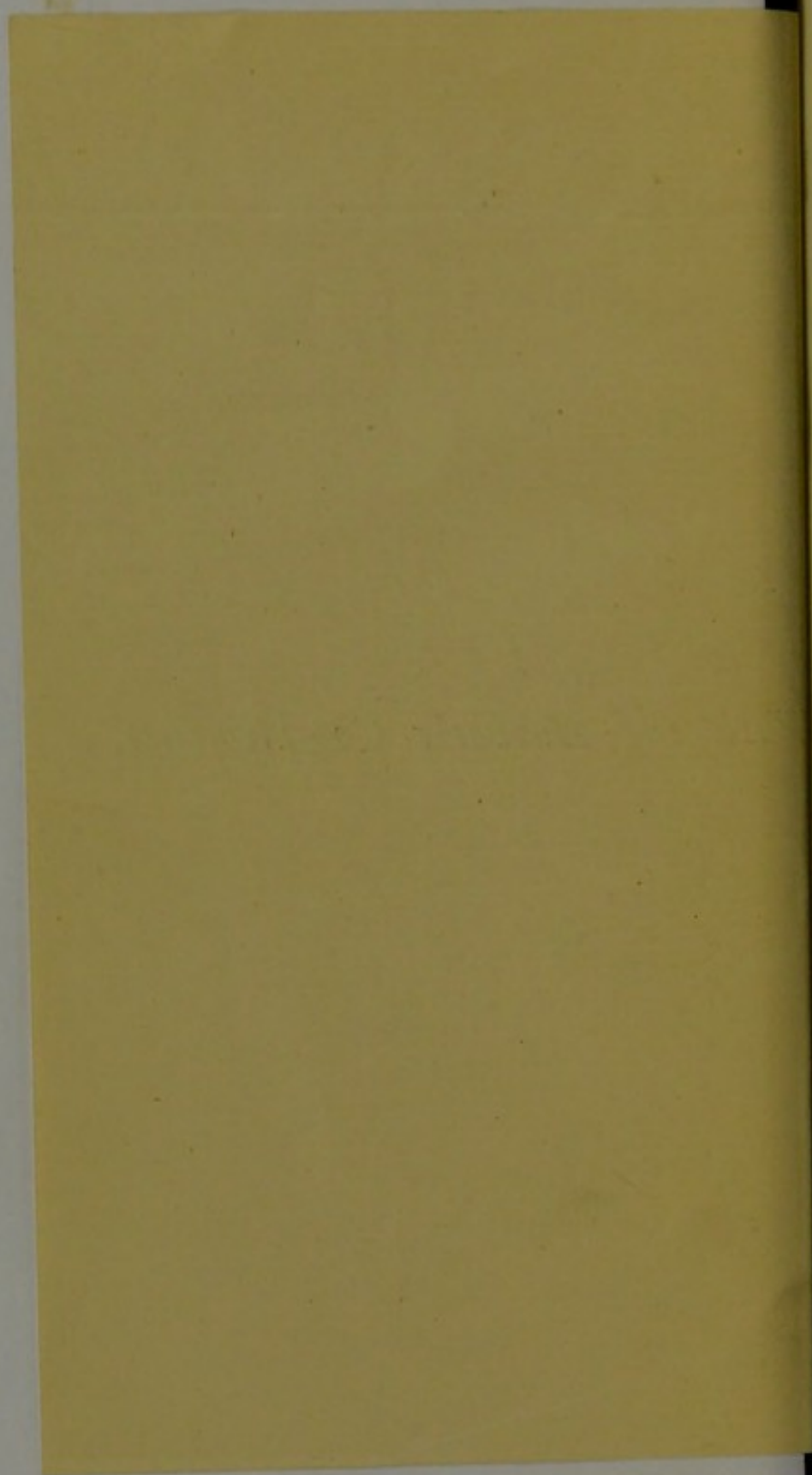
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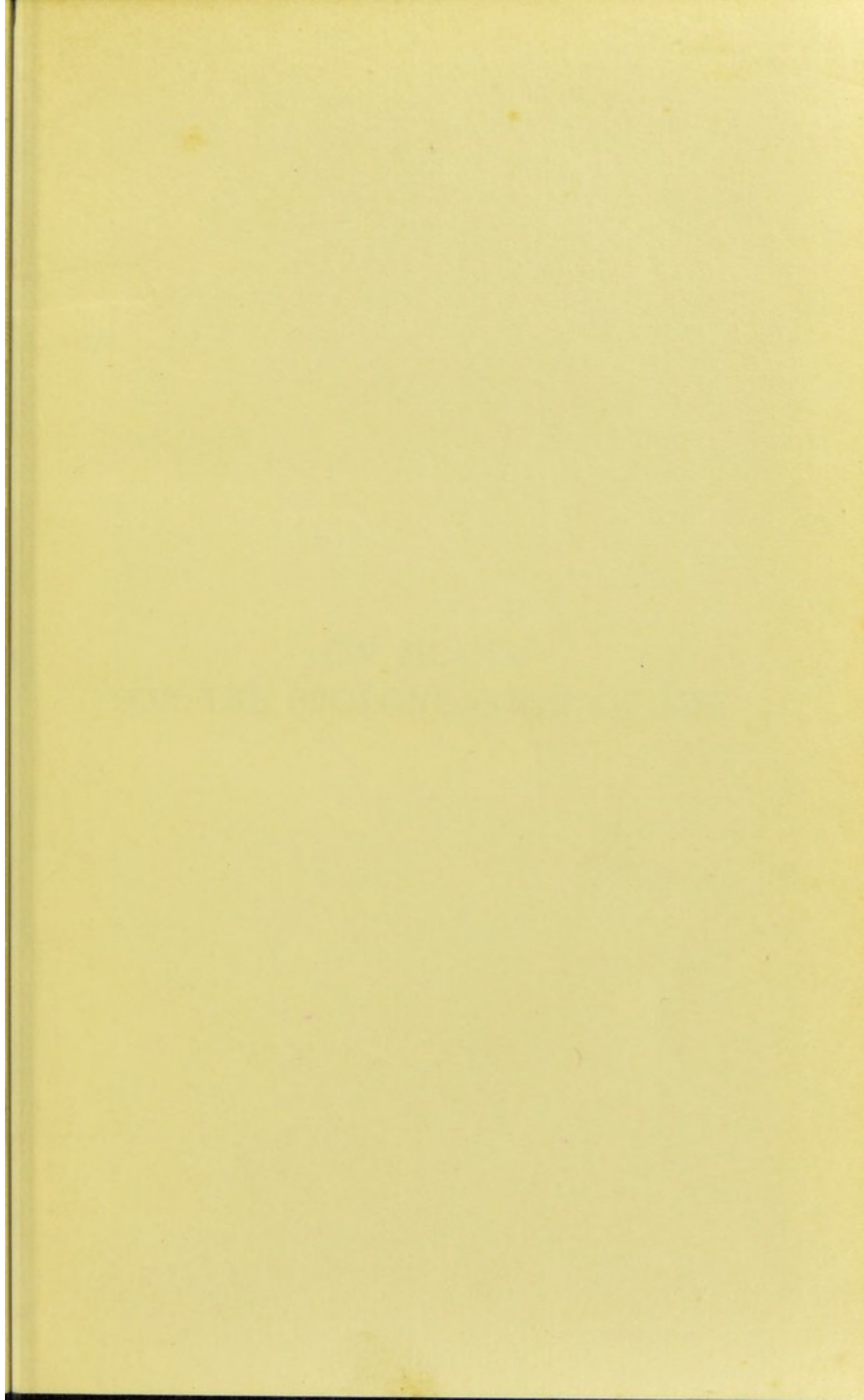










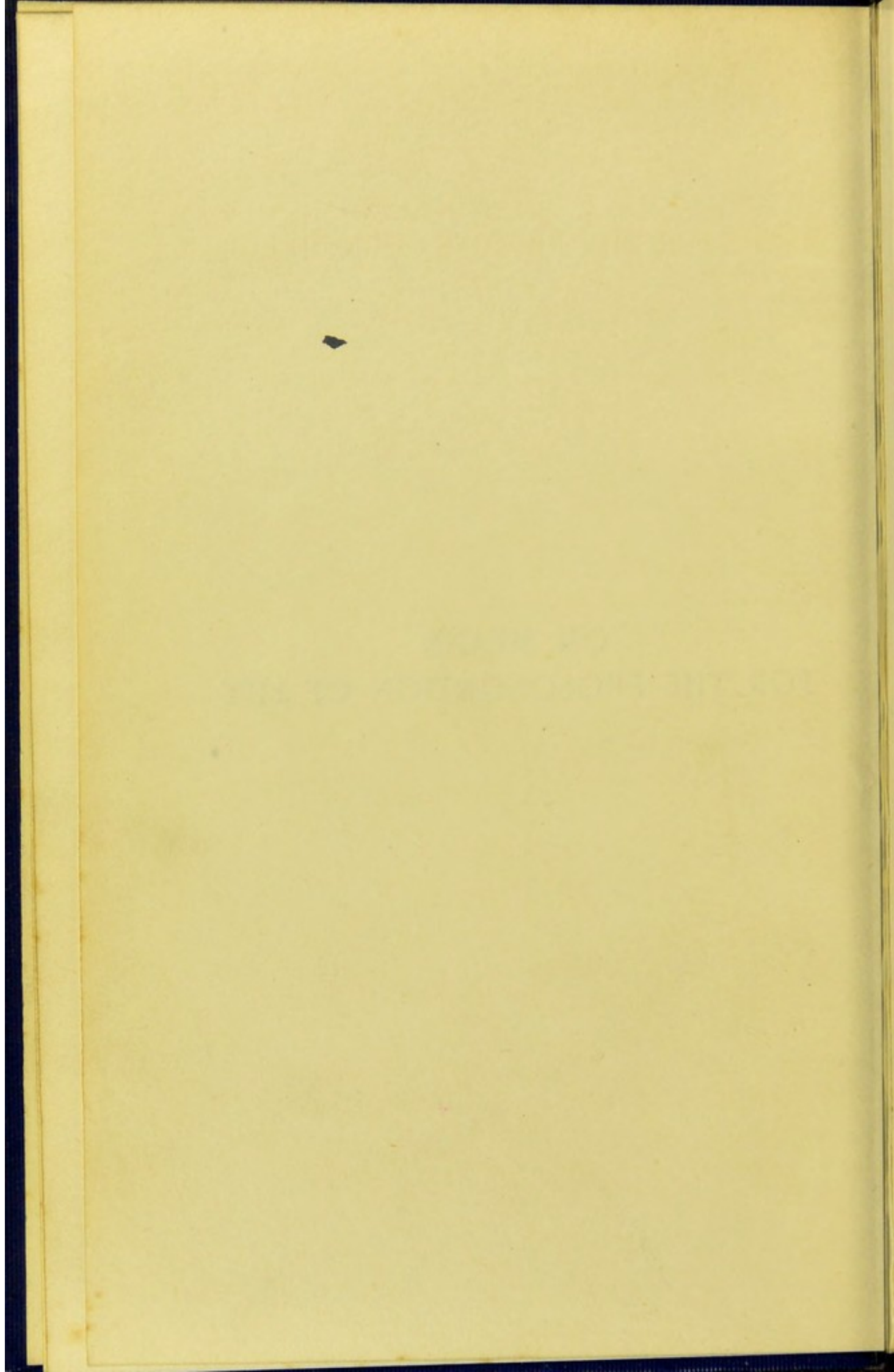






ON MEANS  
FOR THE PROLONGATION OF LIFE





ON  
MEANS FOR THE PROLONGATION OF LIFE

SECOND AND ENLARGED EDITION OF A LECTURE DELIVERED BEFORE  
THE ROYAL COLLEGE OF PHYSICIANS, ON DECEMBER 3RD, 1903

BY

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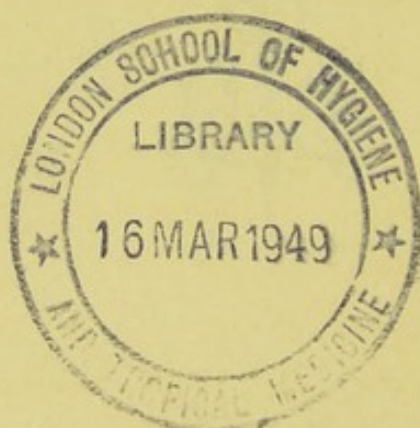
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# On Means for the Prolongation of Life.

BY SIR HERMANN WEBER, M.D.

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MR. PRESIDENT, FELLOWS OF THE COLLEGE AND GENTLEMEN,—The subject of the prolongation of life is a very large one, especially if considered with regard to the whole population from infancy onward.

The diminution of infant mortality and the improvement of the hygienic conditions of towns and houses have raised, and will continue to raise, the average duration of life. Here is a wide field of usefulness, and one of the most important sections of it will be the combat with the various forms of pathogenic microbes (Pflueger [62]) in which men like E. Jenner, Pasteur, Lister, Koch, and others have rendered immortal services to humanity. And besides, the improvement of dwellings and food supply to the labouring classes, and the physical education of the entire population, which ought to commence in the nursery, and ought to be insisted on at all schools, public and private, will not only contribute to the prolongation of life, but improve the whole race, so that our grandchildren ought not to hear any more of the deterioration of the physique of recruits and other candidates for the army and the professions and



trades. By such means the resisting power of the organism to disease ought to be developed from an early period of life. Dr. P. K. Pel [60], in an excellent address on the art to live long and happily, urges with justice that at school already boys and girls ought to be taught how to maintain their health and to avoid injurious influences. This very promising subject will, as far as possible, not be touched in the present discourse, which will relate principally to the prolongation of the life of adults by the arrangement of the manner of living. This more limited field of work deserves likewise our serious attention, since the death rate of persons after about 55 or 60 has not decreased during the last 30 or 40 years, while that of children and adults below 45 is now considerably lower than it was then, as shown by the annual reports of the Registrar-General. We must endeavour to reduce the death rate of persons in advanced years by increasing the longevity of the individuals. I must premise, however, that this lecture is a purely empirical and preventive contribution and does not enter into the pathological anatomy so ably treated by Sir G. Humphry, by Dr. Savill [66] in his interesting papers before the Medical Society in March, 1897, and in the *Royal Medical and Chirurgical Society's Transactions* [66], nor into the clinical symptoms sketched by Professor Clifford Allbutt [1, 2 and 3], by Dr. Savill, Dr. F. Parkes Weber [76], Oertel [52 and 53], G. W. Balfour [5], Metchnikoff [44], and others, nor shall I say much about the mental changes which have quite lately been discussed by Prof. Osler [56a] and by Sir Samuel Wilks [82]. I shall only suggest a manner of living by which they may be post-



poned as long as possible, excluding in this discourse treatment by pharmaceutical remedies, and by organo- and serum-therapy.

Much has been written on this subject from remote antiquity up to the present time. When I think, for instance, of Galen's "De Sanitate tuenda," Cicero's "De Senectute," Bacon's "Historia vitæ et Mortis," Hufeland's "Makrobiotik" [33], Sir John Sinclair's "Code of Health" [67], Pflueger's [62], Ebstein's [22], and many other good essays on this subject, it may look presumptuous that I address on it so learned a body; but the facts that I have occupied myself with it for half a century, and with a certain measure of success as well in others as myself, and that I may perhaps open up some fresh aspects, embolden me to place before you in a condensed form some of my experiences and views; and I am further moved to this course by an astonishing disregard of the means of prolonging life on the part of the public as well as the profession.

Before we consider how we can attain the natural term of life we must say a few words about what we may regard as the *natural term*. The great ages attributed to the Hebrew patriarchs need not occupy us here. It is enough to point out that at the time of the Psalmist no such ages were reached, since he put the limit to 70 and 80 years. The difficulties of verifying the statements of great ages in past generations are very great, and due criticism has not been exercised. Even the generally accepted great ages of Henry Jenkins, Thomas Parr, and the Countess of Desmond are, according to the investigations of Mr. W. Thom [69] to some degree mythical.



We have no proof that these three persons reached the ages which are attributed to them, but Mr. T. E. Young ("On Centenarians," 1899) cites from the records of Life Assurance and Annuity Societies in England 7 cases of male and 15 cases of female lives having lived to between a hundred years and a hundred and five years and eight months. This statement we may receive as perfectly trustworthy, but considering the very large number of lives among which these 22 cases of the duration of life beyond a hundred years have occurred, we see that such a duration of life is excessively rare. Dr. Tatham, Superintendent of Statistics of the General Register Office, has kindly informed me that according to the census of 1901, there were in the whole population of England and Wales living above ninety years, 3,056 males, and 6,482 females, in all 9,538; and above a hundred years, 47 males and 99 females, in all 146.

The results of the enquiries of the Collective Investigation Committee of the British Medical Association, judiciously analysed and interpreted by Professor Humphry in his delightful little book "Old Age," give similar proof. We are therefore justified in assuming, that although life is usually limited to eighty years, it may occasionally be prolonged to a hundred and even more, through the operation of particular internal and external agencies. By carefully studying these agencies, and acting on the results obtained, and by avoiding and combating other agencies likely to shorten life, we may often succeed in prolonging life to the limit natural to the human species, which, under favourable circumstances, may, in course of time, be raised to 100, and occasionally beyond.



In examining the circumstances under which man is likely to reach the natural term of life, and especially the manner of living by which this end can be promoted, we must not allow ourselves to be deterred by the experience that some of the most long-lived persons have led injudicious lives, and that great longevity occurs occasionally under the most different circumstances. After having carefully entered into the records of more than 100 cases of very long-lived persons, I have reason to say that by far the majority of them were temperate; were small meat eaters; lived much in the open air; led an active life; many a life of toil with great restrictions as to food and comforts; that most of them were early risers; that a great number of them had a joyful disposition, and performed their work cheerfully; and that only a few were intemperate or idle and lazy persons. We must keep before our eyes the means and circumstances by which the health of man is produced and maintained, and those by which it is usually deteriorated, since the former are likely to promote, while the latter are almost sure to prevent, longevity in the large majority of cases.

We must, in laying down certain rules towards the promotion of a long life, and of a vigorous and happy old age, not be checked by the remarks which we constantly hear, that such rules are irksome, that it is better for man to live a short and enjoyable life, than a long and tedious one with many restrictions; that it is not worth while to live to an old age full of suffering and of physical and mental weakness. No, we do not wish to prolong life merely for living long; but to prolong mental and bodily



energy, and this with a measure of enjoyment and usefulness, and without bodily suffering. We are convinced, from a large experience, that the manner of living required for the prolongation of life is irksome only at the beginning, that it becomes easy by habit and leads to health, freedom from suffering, and to happiness much greater than that to be obtained by yielding to the desire of indulgence in sensual or frivolous enjoyment. When I hear that a life of moderation and work is tedious, I am always reminded of the words of Fernando in "The Tempest,"

"And most poor matters  
Point to rich ends."

At first the walking and working may appear poor matters, and not less so the moderation, when one has to curb a good appetite before a richly covered table; but then come the rich ends, health and happiness, and a long and happy life, full of activity, to terminate frequently by falling asleep without suffering.

On the other side it is a fallacy to think that those who indulge themselves by immoderate eating, drinking and sensual enjoyment, can do so without the risk of great suffering, often associated with unhappiness in advancing years. Experience has shown us that the majority do not die suddenly and easily in the midst of their enjoyment, but suffer often for months and years before death releases them.

Amongst the circumstances connected with longevity the most prominent is *heredity*, which means an inherited good constitution. I have endeavoured to ascertain what are the principal factors of this inherited longevity, whether it is to be ascribed more to one system of the body than



to another. Though almost all seemed to have had an all round good constitution, yet there were differences in the different long-lived families; but all of them were endowed, as far as I could learn, with a vigorous heart and good blood-vessels, and I am inclined to ascribe to the circulatory system the greatest share, which, however, cannot be separated from the respiratory system and from the vaso-motor part of the nervous system. It is as a rule not the vigour of the muscular system which leads to longevity; athletes and men with great muscular strength form no great percentage of the long-lived people; nor does great intellectual power seem to be a prominent feature, nor a strong digestive system, which, although useful when well managed, gives often rise to the temptation of over-feeding, while a weak digestion compels moderation, and thus leads frequently to a longer life and happier old age than is obtained by those endowed with a strong digestive system.

The chances of a person belonging to a *long-lived family* are, *cæteris paribus*, much better than those belonging to ordinary families, but it is a dangerous fallacy to rely too much on such a privilege. In a family well known to me, for instance, out of 11 children, whose parents (both) died above ninety, 5 men and 4 women, leading satisfactory lives, lived to 88 and more, while 2 addicted to alcohol died between 60 and 70. In another family of 8 children whose father had lived to 87, while the mother had reached the age of 96, only half of them, viz., 3 daughters and 1 son, lived beyond 86, while 3 sons and 1 daughter died under 70. The first 4 had lived judiciously, while of the 4 dying rather prematurely, 2 sons had over-



indulged themselves with eating as well as drinking, and with drinking only, and the daughter having had a large family became mentally depressed by frequent sources of grief and anxiety.

The tendency to *early death* is likewise hereditary in some families to such a degree that careful Assurance Offices refuse members of such families; but by judicious management, if commenced early enough, the life can be considerably prolonged in spite of the inherited tendency to early death, which seems to be mostly associated with a weak vaso-motor system.

We must endeavour to profit by the favourable influences of heredity, but counteract the unfavourable; we need not die at the same early ages as our forefathers did; we must not adhere to fatalism, which is one of the worst doctrines, but trust in our own work, and in the truth of the proverb, that "God helps those who help themselves." Most persons descended from short-lived ancestors have it in their power to prolong their lives by judicious manner of living.

It seems to me a matter of importance to keep the idea of our power of influencing heredity constantly before our mind. In the same way as different hereditary varieties can be produced in animals and plants, hereditary tendencies can, I think, be produced in man, to long life and early death. If this view were to be taken up generally, and acted upon, we might have, in the course of time, many long-lived and few short-lived families. Much, no doubt, can be done by physical education, great moderation, and suitable occupation; but the most powerful influence would be exerted by well-selected marriages, and



by preventing ill-suited ones ; but this, I fear, will never be sufficiently in our power ; and it would not be quite natural, since love is not generally influenced by considerations of health.

In advising persons with a hereditary tendency to rather early death, it is most important to become acquainted with their family history, the *causes of death of their parents and blood relatives*, since by combating the tendency to these causes of death, from as early a period as possible, we mostly succeed in prolonging life. This is conceded by the majority of medical men with regard to tuberculosis ; but numerous deaths between fifty and seventy, which are caused by the weakness of the fibres of the heart and of the coats of the arteries and capillaries, can be avoided or, at all events, greatly retarded, by regular exercises, including walking and breathing exercises, and great moderation in food and alcohol ; the tendency to atheromatous and allied changes, to apoplexy and paralysis, by similar means, and not less so that to stone in the urinary organs, where the great restriction with regard to food, rich in purin, is especially important ; the tendency to senile bronchitis and pneumonia, which form so frequent causes of death in advanced life,<sup>1</sup> by much air in and out of doors, by respiratory and other exercises tending to strengthen the heart and the lungs ; dipsomania by total abstinence from youth onwards ; and almost all other hereditary causes of death can mostly be warded off by judicious arrangement of the manner of living. By appreciating the individual constitution, the tendencies to disease indicated by the family history and

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<sup>1</sup> See the Statistics in Dr. Savill's paper already quoted.



by the habit of the body, the occupation, &c., we are often able to prevent disease, and the *prevention of disease* is one of the great means of prolonging life. We must endeavour to recognise all the weak points of the entire organism, especially the weakest, and direct our attention to *strengthening these weak points*. Above all things we must bear in mind that *good air* in and out of doors is one of the most powerful factors in improving and maintaining health, and prolonging life.

I could give a great many instances of persons who escaped the diseases of their parents and near relatives by well-adapted management. I will, however, only mention three, beginning with my own case, because you know me and see me before you. My mother died before she was sixty from weakness of the heart, inherited from father and grandfather, which led to frequent attacks of bronchitis and general dropsy; my father died in his sixtieth year from cerebral apoplexy; he had not been an abstainer himself, and his forefathers, during four or five generations, had taken largely the strongest kinds of hock and port, and died from affections of gouty nature, including one of paralysis and one of apoplexy. By moderation and abundant exercise of mind and body, including breathing exercises, I have escaped death from these causes, and have greatly prolonged my life, although I must confess that I have not quite effaced the gouty tendency inherited from five generations.

CASE 2.—Nearly fifty years ago a gentleman consulted me at the age of 41, who suffered from frequent attacks of bronchial catarrh, from weakness of the heart, was rather



stout, had a sedentary occupation, took much meat, and was inclined to constipation and bleeding piles. His father had died from "chronic bronchitis with dropsy" at the age of 61, his grandfather from "bronchitis and congestion of the lungs" at 64; while his mother, belonging to a rather short-lived family, had died from "pneumonia," aged 59. By means of great moderation in eating and drinking, with attention to his bowels, much air within the house and outside, regular breathing exercises, abundant walking exercise and regular occupation, the tendency to bronchial catarrh, to constipation and piles disappeared, and he lived to the age of 75, when he succumbed to a severe attack of influenza. Three brothers and one sister died before they were 60 from chronic disease of the respiratory organs.

CASE 3.—In 1862 I was consulted by a gentleman aged 44, whose father and grandfather had died under 64 years of age from apoplexy; while his mother, who had belonged to a fairly long-lived family, had died after much grief and worry at the age of 69. The patient was of florid complexion, muscular, slightly above the average weight for his height, had had two attacks of gout, and was in the habit of eating and drinking abundantly. He was induced to diminish the quantity of meat, to give up stimulants almost entirely, and to take much open-air exercise; with the result that the attacks of gout ceased after some years, that his general health became perfect, and that he was able to enjoy the pleasures of intellectual and social work up to 78 years of age, when he began to show signs of weakness of the heart after an accident



which prevented his continuing to take active exercise. The final cause of death was pneumonia. Two brothers and a sister of this gentleman died between 60 and 70, from apoplexy, and others at earlier parts of their lives from bronchial attacks and failure of the heart.

We may fairly assume that life in Case 3 was considerably prolonged through his combating the family tendency to apoplexy and failure of the respiratory system and heart, by judicious manner of living; and the same may be said of the subject of the preceding case with regard to the inheritance of tendency to weakness of the heart and respiratory system.

Compare on "The Prevention of Apoplexy," Clifford Allbutt's paper (3).

Death from *old age* is caused by a kind of *atrophy of the tissues and organs* connected with changes in the capillary blood-vessels, and, in some cases, primarily atrophy of the ductless and hæmatogenic glands. For the more accurate description of these senile changes I again refer to Dr. Savill's paper already mentioned [66], and to the articles on "Old Age" in the second edition of Dr. Allbutt's "System of Medicine" [76 and 79]. We must counteract this tendency to *senile atrophy* by supplying the tissues and organs with healthy blood; and to do so we must endeavour to produce a healthy state of the blood and to maintain the blood-vessels and lymphatics in a sound and vigorous condition. Life, we may say, depends to a great extent on the state of the organs of circulation, including the heart, the capillaries and lymphatics, which latter have in old age a great tendency to obliteration, and our aim must be



to keep them in working condition, and to prevent or postpone as much as possible their degeneration by atheromatous and other changes connected with old age. It has often been said, with justice, that the best way to effect this is by keeping the organs in *action*, while *inaction* leads to decay. We must therefore endeavour to maintain the former and to prevent the latter.

Professor Metchnikoff, in his suggestive work on "The Nature of Man" [44, pp. 240-1], ascribes this decay to the action of macrophages, which name he gives to the larger kind of phagocytes, viz., cells which effect the absorption of exudation, and the destruction of hostile microbes. He maintains that the large variety of phagocytes is instrumental in the changes of old age, that they surround the vital parts, for instance, the tubules of the kidneys, and transform them into connective tissue, thus producing the fibrous degeneration of organs which is one of the main changes of senility. This explanation of senile decay does not in any way militate against the view that we must endeavour by all means in our power to keep up the nutrition and functions of all organs and tissues of the body by promoting the activity of the nutritive capillaries.

The physiological processes connected with the all-important question, the *exercise of the organs*, have been studied by Ludwig and his pupils, including in this country especially Sir Lauder Brunton, and independently by Dr. George Oliver, of Harrogate [54 and 55]. During the action of an organ its arterioles become widened, more blood flows into the capillaries and the lymph spaces; more



food and more oxygen are carried to the tissues, and at the same time the waste products are removed. This has often been demonstrated on the muscle whose regular contraction causes increase in size and strength; it is, however, not only the muscular fibre which gains, but the nutritive vessels and absorbents themselves gain equally much by being kept in action. The increased afflux of blood which is caused by the action of the muscle, forces the small vessels to work, and to conduct more blood to the organs and tissues, and thus their coats are kept in a sound condition. At the same time the lymphatics are kept in action by the removal of the increased amount of fluid in the lymph spaces, containing the used up material. Similar is the case with the brain and nerve centres; the acts of thinking and of initiating movements in the voluntary muscles, lead to afflux of blood to the nerve centres, to increased nutrition of the ganglion cells and nerve-fibres and at the same time of the minute vessels, efferent as well as afferent. The increased afflux of blood to the brain by the act of thinking has been shown by the ingenious experiment of Mosso [47], one of Ludwig's pupils, who, as you know, has constructed a finely balanced table on which he placed a man in the horizontal position and demonstrated that during the act of thinking the head becomes heavier, so that the head portion of the table goes down.

The healthy condition of the *heart* and *blood-vessels*, which is necessary for maintaining the nutrition of the organs and tissues, is effected by keeping them in constant action. A certain amount of action is inherent to them



without any effort of the will. This amount of inherent action varies considerably in different individuals. In many constitutions the system of circulation, and, through it, the health of the organs, remains satisfactory during a long life without any special stimulus; but in other constitutions it is apt to decay at a more or less early period of life, and these tendencies to early decay are in many families hereditary, and must be counteracted by judicious means.

If we review the different means in our power to prevent early decay and to keep the circulatory system in a healthy condition, we find that the most efficacious means are given by the different forms of *exercise*.

The mode of action of *muscular exercise* Dr. George Oliver of Harrogate [54 and 55] explains ingeniously in his address delivered before the British Balneological and Climatological Society in May, 1903, to which I must refer you. He has lately been making a large number of experiments on the effects of respiratory and muscular exercises on the blood pressure and on the tissue lymph circulation, and he informs me "that all these exercises (respiratory and muscular) produce the same effects namely: (a) A rise of blood pressure and an increase of tissue fluid during the continuance of the exercise; and (b) A rapid decrease and immediate fall of the pressure, and a diminution of the tissue fluid on the cessation of them;" and he has found "that the rise and subsequent fall in pressure and in tissue lymph are greater when these two forms of exercise are combined, than when one or the other is practised alone." He concludes "that exercise



(whether respiratory or solely muscular, or both combined) stimulates the fluid exchange between the blood and tissue space." Sir Lauder Brunton, in his lecture on Atheroma (*Lancet*, October 12, 1895), describes how each contraction of the muscle drives the fluid onward, and how with each relaxation its tissue juice and products of waste are sucked into the lymph spaces and lymphatics. Thus amongst the effects of all forms of exercise, one of the most important is the promotion of the *removal of the waste products* of the tissues. Many chronic affections, such as gout, premature decay of the small nutritive blood-vessels, are caused by the imperfect removal of the waste materials.

The most natural form of exercise is *walking*. By walking we all know the action of the heart and the breathing are accelerated; more blood is passed into the blood-vessels, which are obliged to contract more vigorously and carry it with greater energy to the different organs and tissues, nourish the latter and become themselves nourished by the work. At the same time the number and depth of inspirations are increased, more oxygen is taken up and more carbonic acid is given out, and the metabolism of the whole body is promoted. Walking also influences the action of the heart in another way; by the contractions of the muscles of the legs more blood is attracted to them and all afferent vessels of the lower extremities carry away more blood from the heart, and the efferent vessels, the veins and lymphatics carry more blood back to the heart and force it to contract more energetically. The circulation of the blood and lymph



in the abdominal cavity is likewise powerfully accelerated by the act of walking; as well through the pumping action of the heart, as also by increased contractions of the diaphragm and abdominal walls. All the organs of the abdominal cavity share the improved state of the circulation. In addition to these effects of walking we must take into consideration the fluid exchange between the blood and the tissues explained by Dr. Oliver's observations previously mentioned. Another effect of walking and of all muscular exercises, is the nutrition of the muscles themselves, and this in itself is a most important means of counteracting the natural tendency to decay; for the atrophy of the muscles is in most persons one of the first manifestations of senility, and is one of the main causes of the loss of weight and the power of heat production in aged people. Yet another effect of walking and other muscular exercise is a change in the distribution of blood in the body; the action of the muscles produces increased afflux of blood to them, by which blood is removed from the internal organs, and stagnation of blood in the interior of the body is counteracted. This circumstance explains also an experience which many people of limited strength make on themselves, viz., that hard walking or other hard muscular exercise taken soon after meals, disturbs their digestion. The explanation is—the action of the voluntary muscles takes away part of the blood which the stomach requires for its work after meals.

The *amount of walking* necessary and useful to maintain health varies widely in different persons and even in the same persons under different circumstances; we may say



from half-an-hour to two or three hours a day, part of which may be taken in the morning, part in the afternoon.

We must, however, consider not only what it is *desirable* to do, but what *can* be done. Great is the difference in different persons and even in the same person at different times. It depends not only on the general strength but also on the varying state of health, on habit, on age, on the meteorological surroundings, such as heat or cold, humidity, wind or stagnation of air, on the clothing and other circumstances. What is only just sufficient for one is great excess to another, or to the same person under different circumstances. In persons unaccustomed to exercise a long walk or an active climb of some hours can produce an overstrain of the heart of grave import, while the same person after some training can make a similar exertion without even any feeling of fatigue. The amount which is useful and possible must be judged by the condition of the individual at the time being. We cannot lay too great stress on this point. We have repeatedly seen irretrievable harm and even fatal termination caused by hard walking, especially climbing in the Alps and in the mountains of Scotland, and by exhausting running and rowing matches, in persons who were not in condition when they undertook them, while they had been able to undergo greater exertions six or twelve months before, when they had become accustomed to them by gradually increasing work.

The *pace* of the walk deserves likewise consideration, and ought to be different in different individual conditions. We hear sometimes that persons are told to walk two, or



three, or four miles an hour, but no general rules can be laid down excepting perhaps this, that the pace ought not to be so great as to cause palpitation of the heart or breathlessness, and, on the other side, ought to be quick enough to produce a gentle glow of the whole body. Here, again, habit is of great importance, and this ought only gradually to be trained, and not to be changed suddenly. When a person, accustomed to a rate of one or one and a-half to two miles an hour, is induced by companions to walk four miles an hour or more, great harm is occasionally done. It is said, sometimes, that a person above 65 ought not to exceed two miles an hour, and ought on no account to run; but by careful training a habit may be produced which allows a much quicker rate even at 75 to 80 and more, if all the organs are sound. *The condition of the organs is of greater importance than the number of years.*

People in advanced age mostly are unable to take as much exercise as those in middle age; but, as already said, habit produces many exceptions.

Those who possess fairly healthy organs of circulation, derive more benefit from gentle uphill exercise than from walking downhill or on the level ground. Also in weakness of the muscular fibre of the heart and moderate degrees of dilatation, graduated uphill exercise, as suggested by Oertel [53], has a most beneficial effect.

It is scarcely necessary to remark that these suggestions as to walking are intended only for healthy persons, amongst which we include persons with old mitral affections but with perfect compensation, but not for convalescents



from acute diseases, and least so from rheumatic fever with heart complication.

This regular walking exercise, provided the health is fairly good, ought not to be interrupted by so-called *bad weather*; it ought to be taken in all kinds of weather, may it rain or may the sun shine, may it be cold or warm. Many people with a tendency to rheumatism are excessively afraid that walking in rainy weather causes fresh attacks of rheumatism or increases the rheumatic troubles from which they are already suffering; but with proper protection by clothing, strong boots and umbrella, and changing the clothes at the end of the walk, this fear is mostly unfounded. Almost all otherwise healthy persons become easily accustomed to every state of weather, and the tendency to rheumatism and catarrh from chills is either totally overcome by it, or at all events very much diminished. When I asked, through a mutual friend, Moltke, the great general, by what means he had maintained his health and activity, he answered: "By great moderation in all things by regular outdoor exercise in all weathers, good and bad; never a whole day at home." He was in his ninetieth year at that time. This rule, however, does not hold good for those whose resisting power is weakened either by disease or by old age. They, or at all events many of them, ought not to expose themselves to the fogs or strong, cold winds of our English winters and springs, and either stay at home on the more inclement days, or, if they can afford it, spend those seasons in warmer and sunnier climates, or at one of the sheltered localities of the southern or



western sea coasts of England or Ireland. These localities ought to be provided with numerous open shelters where invalids can rest for hours in the open air without being exposed to cold winds and rain.

It is of great use for those who are still in fair vigour to take regularly, once a week, *a day of more prolonged exercise*, up to three, four and six hours; and those who live in town ought to spend this day of extra exercise in the country, if possible, on account of the purer air and the change of scene. The benefit of such a long walk is increased if only a very small quantity of food and fluid is taken during the walk, for instance, a sandwich or a few plain biscuits, and an apple or an orange. One of the visible effects of such a walk, combined with a very restricted taking in, is that the body loses mostly between two and seven pounds during the walk. The amount of loss varies according to the condition of the walker, the duration of the walk, and other circumstances; as a rule, not without exceptions, large persons lose more than small ones; fat persons more than lean; those who are unaccustomed to long walks lose more than those who habitually take them; those who drink much before starting more than those who have taken only a small amount of fluid. A fast walk connected with some climbing leads to a greater loss than a walk at a slow pace and on level ground. The amount of, or the absence of, sunshine, the temperature, the relative humidity of the air, the presence or absence of wind, and other agencies, exercise considerable influence on the amount of the loss of weight. This loss consists almost entirely of water through the skin, the



lungs and the kidneys, but with the water some salts and excretory substances are removed. By the simultaneously increased removal of fluid and diminution of supply of solid food and fluid more used-up material is withdrawn, and the somewhat thirsty blood and starved tissues are enabled to take up more new material. The weight lost on the long walk is usually regained within two or three days. The *increased removal of waste products* is one of the most beneficial influences of such a weekly long walk.

Many persons, including some medical men, are of opinion that it is injurious to take much active exercise, especially in advancing years, that the body is sooner worn out by it than by rest or very restricted exertion. A friend of mine, who was known by many of you, the late Mr. George Pollock, often told me this and tried to dissuade me from my long walks, as he believed that they would wear me out sooner than rest. He did not succeed in dissuading me, as I am sure that this "wearing out" theory of the organs by making them work is wrong. The animal body is not a machine made of dead substance like wood or leather, but is made of living organs and tissues which by action are not worn out, but nourished and maintained in working order, provided always that the exercise is not over-exercise. It is true that work causes wear of tissue, but the wear is compensated by increased supply and increased power to assimilate this supply. Dr. Martin Luther's motto, "*Rast ich so rost ich*" (If I rest I rust), is perfectly true. Old persons accustomed to much exercise may go on taking it *as long and as much as agrees*



*with them, and need not think of the number of their years*; but they must keep up the habit if they wish to keep up their power, for if they leave off walking for some weeks or months, it frequently happens that they cannot resume it without injuring themselves. In this respect there is a great difference between the old and the young. Young people who have been prevented taking active exercise by one cause or another, can easily resume it and gradually increase the amount; but in old persons the muscular fibre, the involuntary as well as the voluntary, has a great tendency to become atrophied, unless it is kept in action, since the small nutritive vessels become likewise atrophied by want of action.

One of the great advantages of several hours' exercise in the country is the exposure to the open air, which is scarcely to be overrated; it strengthens the skin and the nervous system, and through this the digestive system and the whole organism; it cheers the mind; it increases the resisting power to meteorological influences, and diminishes the liability to chills and other morbid microbic affections, and this *resisting power* is one of the great factors of longevity. Life in the open air, by itself, even without exercise, increases the resisting power, and ought therefore to be arranged for delicate persons who are unable to take much active exercise; it may be done by driving in open carriages or in bath chairs, by lying in hammocks, or by sitting and lying in open verandahs, or in *open shelters*, such as now fortunately are being multiplied at most of the seaside resorts, and ought also to be abundantly supplied at all inland health resorts and



in private gardens and parks. It is not for tuberculosis alone that open-air treatment is useful, preventive as well as curative, but also for almost all other chronic affections.

People to whom the so-called "walking without an object" is tedious, must endeavour to find an object; I have often, for instance, succeeded in inducing people to take regular walks, by suggesting to them to keep dogs, and, in consequence, they walked for the sake of their dogs. When the dog scheme is impracticable, I often succeed, though sometimes only with difficulty, by explaining the ways by which open-air exercise influences the health of the body. When persons understand this, their knowledge stimulates their will, and the will overcomes the dislike, and increases their power, and gradually the feeling of improved health leads to actual enjoyment of that which had formerly been tedious to them.

Still more beneficial than the once-a-week extra exercise, is the plan of taking once or twice a year a *walking or climbing tour of three to four weeks or longer*,<sup>1</sup> in mountainous districts, especially in the neighbourhood of and on glaciers, with three to six or occasionally even eight hours' active walking or climbing on most days of the week, provided that the organs of the body are free from disease, and that they be gradually accustomed to the increased work. The amount of benefit to be obtained from such tours, if judiciously arranged, can scarcely be exaggerated. They exercise an actually rejuvenescing influence in which every organ of the body shares more or

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<sup>1</sup> "On the Hygienic and Therapeutic Aspects of Climbing," by Hermann Weber, M.D., *The Lancet*, October 28, 1893.



less, from the brain to the skin and hair. The power for mental work is increased, the view of life's duties and its worries and hardships is corrected, and often I have observed that the hair of the head and beard, when commencing to turn grey, has resumed, after good courses of climbing, more or less of the original colour. The action of the heart is likewise in all persons tangibly improved, in some to an astonishing degree. Again and again I have witnessed in many others and in myself, that while before the climbing tour a slight exertion in walking caused the pulse to rise from 60 or 65 to 110 and 130, the same or even much greater exertion produced after the climbing tour only a rise to 80 or 85. The pulse tracings by the sphygmograph are equally significant. The removal of waste products to which I have already alluded as an important effect of all forms of exercises, is most thoroughly accomplished by these walking and climbing tours. I must, however, lay stress on the condition already mentioned, that the different organs of the body must be sound if such courses of extra exercise are to be practised. I have repeatedly seen great harm follow them in persons affected with diseases of the heart, the small blood vessels, the lungs, the liver, kidneys and spleen; in various forms of diabetes, albuminuria, and anæmia. For these, too, open air and exercise are very beneficial, but their use must be carefully arranged according to the individual condition. The practical rules laid down by the late Professor Oertel of Munich for diseased states of the muscular fibres and valves of the heart are most important [53]; but similar rules and restrictions are



required also for other morbid affections besides those of the heart.

The remarkable improvement in the heart's nutrition and action effected by climbing tours, is, I think, to a great degree caused by the deep inspirations which are necessitated by the act of climbing, especially steady and prolonged climbing. This consideration has led me to pay particular attention to *respiratory exercises*, which since then have been very useful to myself and many others, especially persons with weak heart muscles.

I make no claim of originality for these movements. Although I have come to them more than 30 years ago by my own observations and experience, I gladly acknowledge that I have been forestalled in their publication by others, and especially by Dr. Harry Campbell's excellent work on "*Respiratory Exercises in the Treatment of Disease*" [11]. I have learnt some of them from Dr. Hamel, and have only modified them; they are all modifications of several older systems of gymnastics. As in walking and other bodily exercises, the amount and modus of respiratory movements which are useful, greatly vary with the individual condition, and must be adapted to the latter. It is often injurious in cases of weakness of the heart or lungs, or the sequelæ of pneumonia or pleurisy, or other acute disease, especially influenza, to begin at once with forced respiratory movements. I have mostly commenced, even in healthy persons, with moderately deep inspirations and expirations continued during three to five minutes, once or twice a day, and have gradually increased the exercises to ten minutes or a quarter of an hour. The depth of each



inspiration and expiration, and the duration of holding the breath, are likewise to be only gradually increased. At the beginning an eighth, a sixth, or a quarter of a minute for every inspiration and every expiration ought to be sufficient; if this is well borne, each act may be gradually prolonged in duration, so that in the majority of cases each inspiration and each expiration may be brought up to a minute, although in the majority of cases half a minute is quite enough for each act. I usually advise to inspire in the erect position with raised arms and closed mouth, and to bend down the body during expiration so that the fingers touch the ground or the toes. The expiration may be made quite well with open mouth, if preferred, but for the inspiration the breathing through the nose with the mouth shut has advantages, such as warming the air and removing palpable impurities by the passage through the nasal cavities. By degrees one can learn to make several up and down movements during every inspiration, and bend and raise the body several times during the expiration. By this alternate bending and raising of the body we gain the additional advantage of strengthening the lumbar muscles, and through this successfully combating the tendency to lumbago. Another useful combination with the respiratory exercises is the turning of the body round the axis of the spinal column alternately, with deep inspiration from left to right, and with expiration from right to left, with the arms raised to the horizontal position. By this movement we bring into action in addition to the lumbar muscles some of the muscles of the spine which are apt to be only imperfectly



used by most persons, especially in advanced years, and the stiffness of the neck and spine and the tendency to stoop, so common in old people, can be to a great degree corrected by such means, if commenced in good time, and practised regularly and thoroughly, although we ought not to be satisfied with this, but ought always to walk and stand in the erect position. The swinging of the arms round the shoulder joint is likewise a useful combination, say the swinging of the right arm with inspiration, and of the left with expiration. Other combinations with muscle and joint movements will occur to those who have accustomed themselves to these respiratory movements; but the latter ought always to have our principal attention, since to them the beneficial effect on the heart and lungs is mainly due. In addition to the influence on the circulation, the respiratory movements keep up the nutrition and efficiency of the lungs themselves, which undergo in old age a kind of atrophy; the walls of the smallest divisions and air cells become thinner, and a kind of senile emphysema is developed, which by these exercises is to some degree prevented. Another important influence consists in maintaining the elasticity of the chest walls, which are apt to become stiff in old age, and thus to interfere with the free movements of the lungs and the pleura. If for some reason the erect position should be inconvenient, the mere respiratory movements can be made also in the horizontal and sitting positions. I have already alluded to the additional advantage of the compression of the abdomen, which is effected by deep expirations, and which ought



always to be practised thoroughly; all the organs contained in the abdominal cavity are compressed, and the blood is squeezed out of the veins, which yield more easily than the arteries, owing to the flaccidity of their coats. We may further point out that the action of the serous membranes of the pleura, the pericardium and the peritoneum are also beneficially influenced by the deep respiratory movements, which constitute a kind of massage to the lungs, the thoracic walls, pericardium and heart (Sir Lauder Brunton). All the organs of circulation, heart, arteries, veins and lymphatics are powerfully influenced by the deep respiratory movements. In trying to explain the effects of these respiratory movements we must not forget the important item of the fluid exchange produced by them between blood and tissues (Oliver).

We must, however, not restrict our lung-gymnastics to these few minutes of respiratory exercises; but we must create the habit of taking at several other times of each day deep inspirations and expirations, especially while walking. At first we are apt to forget this, but by often reminding ourselves of it, it is not difficult to create this *habit of deep breathing*, and the advantages of it are very great in strengthening different organs, as explained, and in maintaining the resisting power of the organism, and thus preventing disease.

The benefit effected by these respiratory practices abundantly repays the time spent on them. Very often I have seen that persons who got out of breath by short walks and climbs, and for this reason abstained from them, and in consequence suffered in their health and spirits, have



become, with the help of these movements, active walkers and climbers, improved in every function of the body, and have outlived by many years their brothers and sisters who had not practised them. The breathing exercises are especially useful to literary workers, statesmen, professional men and others who are unable to take one of the usual modes of exercise. The most convenient times for practising them are in the morning before or after the bath, when the body is loosely covered with flannel, and in the evening when dressing for dinner, or before going to bed. I ought to add that they are not suitable for very delicate persons ; they are, for instance, injurious in great dilatation of the heart with or without valvular disease ; such affections require much milder movements like those practised at Nauheim ; nor are they suitable in active tuberculosis and in tendency to pulmonary hæmorrhage, and in the early stage of convalescence from severe acute diseases. In quiescent tuberculosis, however, and in the imperfect expansion of the lungs, resulting from pleuritic effusion, they can be rendered beneficial by practising them judiciously. These respiratory exercises, combined with movements of the limbs and trunk, are different from P. H. Ling's so-called "Swedish gymnastics," but the latter are likewise most useful for the maintenance of health, and they can be adapted with numerous modifications, according to individual conditions, to many persons who are unable or disinclined to take ordinary walking or riding exercises, or who have local defects of movement from disease or want of use. The so-called Danish exercises and Streber's



gymnastics (Streber's Zimmergymnastik), too, have many similar advantages and also ordinary gymnastics as they are practised, especially in Germany, under the name of "Turnen," although the latter are rather less suitable to old age than to the earlier periods of life, unless they are specially adapted to the more or less altered conditions of the body.

Another convenient form of exercise, especially useful in gouty people, recommended by Dr. Oliver, is what he calls the *static or tension exercises*, which consist in the static contraction of all the muscles of the body, while standing, from one to two minutes several times a day. In goutiness the arterial pressure is increased and the tissue fluid is prevented from returning to the blood and lodges in the tissue vacuoles. Tension of the muscles diminishes the arterial pressure, and allows the tissue fluid to be absorbed. Dr. Oliver finds that one minute's tension clears up as much as 20 per cent. of lymph. These tension exercises may be practised best an hour before all meals, when Nature itself produces a normal fall in the arterial pressure; but other times may be substituted, if more convenient.

While recommending walking and climbing tours and respiratory exercises and various forms of gymnastics, I must guard myself against the indictment that I disregard the value of riding on horseback, rowing, golf, cricket, football, swimming, hunting, shooting, and different kinds of sport. I, on the contrary, regard them as most useful to a very large number of persons, but I am unable to enter upon them in this short discourse.



Attention to the *digestive system* and *food* is almost as necessary for the promotion of longevity as that to the circulatory and respiratory systems, which are intimately connected with them. It is impossible to lay down strict rules, as the rule which is good for one is unnecessary and sometimes injurious to another. Articles of food which cause indigestion in one person, or at a certain period of life, or in a certain condition of a person, as for instance beef or eggs, or lobster, or strawberries, or mushrooms, are perfectly well borne by another person, or even by the same person under changed conditions, even in weak health. One has to study in every case the constitution, the degree of activity, the individual peculiarities and the influence of habit, and to arrange the selection of food accordingly.

One rule, however, we can lay down with perfect safety, viz., that great moderation in the amount of food, and especially of the most nourishing articles (flesh food, cheese and pulses), ought to be practised by everybody, particularly by old people, and that this moderation is a great aid to longevity; but here again the term "moderation" must have a different meaning for different persons and is to be judged individually. We shall return to this point presently; before doing so, however, we must allude to the wide-spread error, that persons who abstain from alcoholic stimulants may eat large quantities of meat and eggs and other highly nutritive substances. In acting on this erroneous view they, or at all events many of them, gradually develop changes in their blood-vessels which may not come to their perception at once, but for all that take



place, and may later on show themselves as gout, dilatation of the heart, arterio-sclerosis, glycosuria, disease of the liver, the kidneys, &c., &c. Professor Baeumler has clearly explained this in his recent contribution on arterio-sclerosis [4*b*]. An unnecessarily large amount of food, especially flesh food, often, by developing disease of the minute blood-vessels, prevents the flow of blood to the tissues, and causes, in fact, their starvation, while a limited but sufficient amount, which is often erroneously called "starvation diet," improves and maintains their nutrition. *Superabundance of food causes, in fact, much more frequently starvation of tissues than what is often called "starvation" diet, while the latter maintains them in a healthy condition.*

Most persons accustomed to indulge a large appetite, whether abstainers from alcohol or not, if you tell them that they must reduce the amount of food, must take only little meat and flesh food and alcoholic stimulants, think that you are going to starve them, that it is impossible for them to do their work on reduced allowances. They are mostly confirmed in this view by their relatives and friends, especially ladies. They ascribe any feeling of lassitude, headache, neuralgia, disinclination to active work, which may occur to any one from too large meals and under the most different circumstances, to the diminution of alcohol and meat, and under this impression discontinue carrying out your suggestions. It is quite true that in many people such reductions, when made too suddenly have injurious effects, at least temporarily; but if the reduction is made gradually, the body becomes easily accustomed to them and the mind too. Some of the



inconveniences felt are with some persons due merely to the fear of being lowered. Experience in many hundreds of cases authorises me to say that gradual reduction carried out with judgment and perseverance, leads almost always to increase of mental and physical power, cheerfulness, and the prevention of premature old age, and the sufferings connected with it. Few people know how little food is required to maintain health, especially in advanced age. Amongst the results arrived at by the "Collective Investigation Committee," we find that only few (5 per cent.) of the persons above 80 years, had been large eaters of animal food, and that the majority had eaten only little meat (Humphry, Professor G., "Old Age," Cambridge, 1889, p. 127), and this is the result of my own experience. Sir Henry Thompson has given excellent advice in "Diet in Relation to Age and Activity" (edition of 1901), and not less so Dr. George Keith in "Plea for a Simpler Life" (1896) and "Fads of an old Physician" (1897), and also Dr. Burney Yeo in "Food in Health and Disease"; but their lessons are not acted upon by the majority. As long ago as 1558, L. Cornaro, of Venice, has shown by the description of his own manner of living, when he was more than 90, in his "Discourses on a Sober and Temperate Life," [16] how, on a very small amount of food and wine, one can maintain perfect health and happiness and reach a very old age. He lived to over 100 and died without suffering. Addison gave a paragraph on this book in the *Spectator*, vol. iii., No. 195, and Abernethy evidently recognised the practical correctness of Cornaro's precepts, if we may



judge from an amusing sketch in the possession of the Medico-Chirurgical Society, to which Dr. Parkes Weber has directed my attention. It represents Abernethy lying on the floor, near a table covered with food and wine, at which two ladies and a gentleman sit; to them Abernethy delivers a short lecture, from which I will only quote a few words. "You should take my blue pill now and then, fasting. Read Cornaro on Temperance, he lived to nearly the age of Methuselah! Practise his rules and regimen (if you *can*), get up before sunrise and get to bed after sunset. Sluice yourself every morning, winter and summer, with cold water. Lie on your back as you see I do, every day after dinner." Cornaro did not require *blue pills*, because he ate less than we may suppose Abernethy's patients did.

Sir William Temple says in the chapter "Of Health and Long Life," essentials amongst primitive people are: Great temperance, open air, easy labour, little care, simplicity of diet, rather fruits and plants than flesh [68].

During my observations on this subject extending over more than fifty years, I have been able to enquire into the manner of living and other antecedents, of over 80 persons living to between 86 and 100 years. Although most of these persons belonged to the well-to-do-classes, and were not obliged to restrict themselves, there were not more than six amongst them who had more or less habitually indulged themselves by eating or drinking largely; many on the contrary were remarkable for great moderation in both eating and drinking; some lived almost entirely on vegetables and fruit in large quantities, with the addition



of milk, cheese, butter, and occasionally eggs; and only exceptionally took meat, fish and poultry; the remainder had been judicious and moderate, as well with regard to diet as with regard to their entire manner of living. Milk is, under such circumstances, an excellent substitute for flesh foods; it contains all the nourishing substances required, without giving rise to the formation of much uric acid; it does not irritate the liver, kidneys and small blood-vessels, and renders the work of the heart more easy.

*Vegetarians*, strict as well as modified, can attain long life; but I have not been able to convince myself that in by far the greater majority of fairly healthy people a moderate amount of meat, fish, poultry and game, causes any bad effects. At the same time we must again state our conviction, based on ample experience, that most people enjoy better health and live longer with only little meat and flesh food, and the substitution for the reduced meat allowance of a larger quantity of green vegetables, to which milk and its derivants may be added with advantage. It is especially in advanced age and in persons suffering from gout, arterio-sclerosis and diseases of liver and kidneys that meat ought to be taken very sparingly. Excessive eating, we may remark, occurs also amongst vegetarians, especially those who consume large quantities of pulses, and has similar injurious effects as in meat eaters.

The very strict rules laid down by Dr. A. Haig [30] entirely excluding meat, tea and coffee, are well suited for a minority, but are certainly not necessary for all persons, even not for the majority; and we may add,



that we have seen a rather large number of persons who, after having conscientiously tried Dr. Haig's restricted diet for many months, were obliged to return to a moderate addition of flesh food, on account of loss of strength and weight, although possibly, if they had been able to overcome their dislike to milk, some of them might have better succeeded. To this question, as to so many others, Goethe's words are specially adapted:—

“Eines ziemt sich nicht für Alle,  
Suche Jeder wie er's treibe.”

(“One plan does not suit all,  
Each must try how he fares best.”)

Or better :

“What is fit for A is not fit for B ;  
Let every one to his own course see.”

Those who maintain that a large quantity of flesh food is necessary for average mental and physical vigour, are generally more wrong than those who forbid it entirely. I have had intimate acquaintance with some men and women after the middle of life enjoying good health with a fair amount of mental and bodily strength and happiness, who took only green vegetables, carbohydrates, milk and cheese, all in moderate quantity, and who lived to a happy old age. They were in reality more or less strict vegetarians ; belonged, in fact, to the minority of which I have just spoken. They took, however, also a certain quantity, not immoderate, of tea and coffee without any inconvenience. Dr. Oldham, a Fellow of this College, who quite lately died at the age of 86, much older than any of his near relatives for two generations had done, had been moderate in eating and drinking during the last forty years of his life, but extremely



so during the last six or eight years, when he took no flesh food (including fish and chicken) at all, but only one egg, a small quantity of milk and bread and cornflour. Whenever I saw him he assured me that he had never been so well and so happy in his life, that he was quite free from any suffering, required no medicine of any kind, and was able to take pleasure in the progress of our profession and in the affairs of his family. I have no accurate experience of how little is required to maintain vigorous health. Several physiologists have ascertained this by experiments and calculation. I may refer to Voit, Playfair, and to the more recent researches by Chittenden [14], and to the contribution on "Dietetics," by Sir Dyce Duckworth and Dr. Hutchison, in the *System of Medicine* [20a].

I venture to record here two cases which, although they are not accurate enough for scientific value, give a fair idea of the small quantity of food required for the maintenance of perfect health.

L. T., aged 61, consulted me first in November, 1872, on account of attacks of gout and hæmorrhoids. His father had died of apoplexy, aged 66; mother of cancer at 68. He was himself a powerful man, 6 feet 1 inch in height, weighing 13 st. 5 lb. He was a country gentleman with literary tastes; took much meat and little exercise and slept about ten hours a day. He suffered from gout, constipation, hæmorrhoids and dyspepsia.

Advice: Less meat, more green vegetables, more exercise, 4 ozs. of Friedrichshall bitter water three times a week for two months. To sleep not over 7 hours.

In the course of a year the weight diminished by 12 lbs., and he was altogether better; but he had had several attacks of gout. He then left off butchers' meat entirely, and alcoholic beverages almost so. In May, 1874, he was further improved; but he was not



satisfied with the gain, and we settled on the following diet (for twenty-four hours) :—

4 ozs. of fish or poultry,  
1 pint milk,  
2 ozs. butter,  
8 ozs. brown bread,  
6 ozs. potatoes,  
12 ozs. green vegetables,  
2 or 3 apples,  
1 oz. whisky.

On this diet, to which he kept very strictly, and which was carefully superintended by his intelligent local doctor, the attacks of gout disappeared and he kept perfectly well until 1880, when he became mentally depressed by the death of his only brother from apoplexy (aged 67) and a sister from pneumonia (aged 65). After travelling for some months he regained his cheerfulness and remained well till the autumn of 1890, when chronic bronchitis developed itself. He could not be induced to go to a warmer climate, and died in December, in his 80th year.

F. W., aged 49, came under my observation in March, 1871. His family history was not good : father had died, aged 65, from "dropsy"; mother, aged 61, likewise from "dropsy." Of three brothers, two were gouty, one had died from phthisis. He led an active life in the country—fishing, shooting and rowing. He had during the last five years rather frequent attacks of old-fashioned podagra. He took a large quantity of animal food, and about 1 pint of port or sherry or champagne. Height, 5 ft. 5 in.; weight, 11 st. 5 lb.; red face, large stomach—which some German physicians call "alimentary plethora." The urine contained traces of albumen, and large amounts of uric acid and urates with medium specific gravity. After a course of treatment at Carlsbad the albumen disappeared, the stomach became natural, and he felt well; but later on the attacks of gout returned, and in 1874 he consented to the following plan of diet, which his intelligent doctor in the country carefully superintended, weighing the food at intervals. Ration of food for twenty-four hours :—

3 ozs. of meat, fish or poultry,  
6 ozs. potatoes,  
16 ozs. green vegetables,



16 ozs. milk,  
6 ozs. brown bread,  
1 oz. butter,  
2 small cups of weak tea,  
Half a bottle Zeltinger (Moselle).

This diet he adhered to with only rare intervals, and whenever he took a larger quantity he began to feel less well. He became free from gout, took much open-air exercise, besides some work in his parish and county. After his 70th year he further diminished the quantity of food and left off wine ; he died at the age of 81 in his sleep. Both his brothers died before they were 67, from "gouty complaints," after protracted illness.

In these two cases we may assume that their health was much improved and their lives were prolonged by the change of diet from abundance to great moderation. In neither case was the family history good, and both outlived all their relations by many years. We also see that much less food is required for maintaining health and vigour than is taken by at least nine persons out of ten. It is very probable that the food taken by these two men might have been further reduced if it had been necessary ; but as they enjoyed perfect health and strength, there was no need for trying an experiment.

Almost all authorities are agreed on the subject that in old age the amount of food ought to be very *limited* ; Dr. George Cheyne, for instance, says in one of his rules : "the aged should lessen the quantity and lower the quality of their food *gradually* as they grow older—even before a manifest decay of appetite forces them to it." [13] Sir Henry Thompson says : "Less nutriment must be taken in proportion as age advances, or rather as activity diminishes, or the individual will suffer." [70] Erroneous ideas are



often entertained by the public with regard to the external appearance and the weight of the body. Many old persons are alarmed by their becoming thinner, and to avoid this think they must eat more ; but this is mostly quite wrong. In the majority of cases increase of weight after 70 or 75 is not good, and corpulence where it occurs is to be counteracted by the quantity and quality of the food, exercise and other means. A slow decrease in weight is mostly observed in those who reach a very advanced age. *Corpora sicca durant* was a true saying already in antiquity.

Inseparable from food is the *common salt* (chloride of sodium), which the majority of people consume with many articles of food. Almost all food stuffs contain certain quantities of common salt as well as of other salts (of potassium, calcium, magnesium and iron) which form part of the animal body, and only few articles require an addition of salt. The addition of a small quantity is, however, not injurious, and is, to some persons at all events, useful, since it renders some food substances more palatable to them, which is an important matter in all meals ; but the addition of large quantities of salt, which is a matter of habit with many people, cannot be recommended. It may be quite harmless to some persons, but to some it is injurious, especially to the gouty ; this may be due to sodium, which in some gouty people aggravates their troubles, while potassium agrees much better with them. In a few others it causes an increased flow from the nose, a kind of coryza, and in many persons it produces or increases a



tendency to eczema. The suspicion that the use of common salt may predispose to cancer is as yet without proof.

The quality of the *drinking water* deserves more consideration than it usually receives. We cannot enter upon it thoroughly, but may say that it ought to be almost free from organic matter, and contain only a small quantity of inorganic matter, say not more than  $\frac{1}{4}$  grain of lime and 1 grain of common salt. The fear that soft water is injurious is quite unfounded; but hard water, especially when it contains much sulphate of lime, causes in some persons constipation, and in some urinary concretions, possibly also gall-stones. The water arising from granit and gneiss agrees best with most persons.

It is not only the quality and quantity of food which we take, but also the manner in which it is taken on which health depends. Food ought not to be taken when the mind or body is exhausted by overwork; rest ought to precede the meal under such conditions; further, if possible, food ought not to be taken while the mind is in a state of anger or worry.

All-important is *thorough mastication*, a subject constantly preached, but almost as constantly neglected. Many forms of indigestion and of serious disease of the stomach and intestines, many states of imperfect nutrition of the whole body, are caused by imperfect mastication and by what is called *bolting the food*. Quite lately Dr. Harry Campbell [10], Dr. van Somering, of Venice [73], Mr. Horace Fletcher [26] and others, have again directed attention to this matter in a judicious and forcible manner.



Combined with the fault of bolting is often that of *washing down* the food before it is properly masticated, a grave mistake committed frequently by large eaters and by those who take much fluid during the meals, which in itself is a very injurious habit. No food ought to be swallowed before it has been transformed, by mastication and admixture of saliva, into a thin pap. Many articles of food, especially those containing starch, are imperfectly digested, unless they have been thoroughly mixed in the mouth with saliva, by which the starch is transformed into dextrin. Even fluid food, such as porridge, gruel, soups, coffee, tea, and chocolate, ought not to be gulped down rapidly, but ought to be taken slowly, so as to allow them to be mixed with saliva.

Amongst the great benefits of thorough mastication is the diminution of the formation of gas in the stomach and intestines (flatulency), and further, the prevention or great limitation of putrid fermentation of the food in the intestines, which latter is connected with the development of ptomaines and pathogenic microbes.

Another effect of mastication is that less food is required, because more of the quantity taken in is absorbed and assimilated, and for the same reason the bulk of fæcal matter is diminished, and the evacuations may become less frequent without the disadvantages of retention.

As proper mastication is one of the most powerful and beneficial means of maintaining health, it is self-evident that the organs of mastication, *especially the teeth* and the jaws, ought to be carefully attended to from early life to old age. We must leave this subject to dentists, but we



must insist on the importance of instruction on the management of the teeth in children as well as adults, and the use of good artificial teeth after the loss of the natural teeth wherever they can be afforded. This we hope will be facilitated by the manufacture of cheaper artificial teeth.

It would lead too far to enter here on the preparation of food by cooking, baking, and other processes, although this is an important matter. It is necessary to render the food not only as *easily digestible* but also as *palatable* as possible, since the act of eating ought not to be a mere duty, but also a source of pleasure. The enjoyment of food causes an increased flow of saliva and gastric juices, and thus greatly assists the digestion. Delicate persons with poor appetites ought to be indulged with articles of food which they like and which are cooked according to their taste as far as the condition of their digestive organs allows this to be done.

In urging the necessity of careful preparation and palatableness of food for delicate persons, we must, however, not fall into the other extreme against which Metchnikoff justly protests. "I shall content myself with saying that most of the delicate dishes provided in the homes, hotels and restaurants of the rich stimulate the organs of digestion and secretion in a harmful way. It would be true progress to abandon cuisine, and to go back to the simple dishes of our ancestors." *L. c.*, p. 292.

The public often ask for strict rules about the quantity and quality of food. It is, as already mentioned, impossible to give such in a satisfactory way for people in general, since there are great differences in the require-



ment of different persons according to constitution, age, height, size and weight of body, physical and mental exercise, proportion of muscle to fat and bone, meteorological surroundings, climate, season and other matters.

Rules can only be good when they are adapted to the individual case under given circumstances. We will, however, mention a rough estimation of the daily rations which we have found satisfactory by prolonged observation and experiments made fifty-five years ago on six men in good health, between 22 and 35 years of age, 5 feet 7 inches to 5 feet 9 inches in height, weighing between 140 and 156lbs. These men did every day mental work between six and eight hours, and walked between 4 to 6 English miles. They carried out this way of living during three to six months, with intervals of several days every three or four weeks. They maintained perfect health during the period of experiment, and did not vary more than 1 to 2 kilos, or 2 to 4 lbs., in weight from the beginning to the end. They were medical students and young doctors at Bonn.

The rations consisted of about :—

Milk, 30 ounces.

Cooked meat, 6 to 8 ounces.

Cooked green vegetables and fruit, 16 ounces.

Bread, 16 ounces.

Potatoes, 6 ounces.

Butter, 1 to 2 ounces.

Water, about 50 ounces.

The water was consumed partly as pure water, partly as coffee, tea, wine or beer (rather less than a pint of either, not of both).



In this list eggs, fish, poultry, game and cheese may be substituted for butcher's meat, taking into consideration that an ounce of cheese contains more nitrogenous substance and less water than the same weight of cooked meat. Lentils, white beans, dry peas, mushrooms, and even asparagus must only be sparingly contained in the allowance of vegetables, since they contain a very much larger amount of proteids; none were consumed by the six experimenters. Farinaceous puddings may take the place of bread or potatoes.

Further experience has shown me, that the rations mentioned are *more than sufficient* for healthy adults in the middle ages of life, of average weight, doing a moderate amount of physical or mental work.

There are, however, morbid conditions, such as tuberculosis, in which a larger amount of food is required, especially of milk, butter and meat; and further, during the period of growth and development girls as well as boys, occupied with lessons and active games or other forms of physical exercise, require more food. On the other hand, persons approaching the period of old age, say from 45 or 50 to 70 years of age, ought to be satisfied with barely three-quarters of the rations mentioned, and after 70 with still less. We can speak however, only of a rule which allows many exceptions, due either to peculiarities of constitution, or to habit, or to special occupation, or to increased or diminished physical or mental exercise. Thus, for instance, soldiers or labourers on fatigue duty or extra work, require more than the average; even old men doing an unusual amount



of labour with body or mind, or both combined, are through this enabled to consume more than those at only ordinary work. On the other hand, persons doing comparatively little work require for the same body weight rather less than the more active ones.

The proportion of the different kinds of food ought to be arranged according to the peculiarities of the body. Persons with a large mass of muscle have a greater waste of nitrogenous matter than persons with small muscles; the former require a larger amount of nitrogenous food than the latter in order to maintain the equilibrium. The degree of activity of the nervous system has likewise to be considered in determining the amount of food required, and not less so the habitual energy of breathing in which different persons greatly differ. The shape of the body, too, has to be taken into consideration, for a long and thin body loses for the same weight more heat than a round and fat one. The amount and nature of clothing exercises likewise influence on the amount of heat lost by the body. In cold climates and cold weather more food is, by most men, required, especially of fat and carbohydrates, than in warm climates and warm weather; also the manner in which the food is taken influences the amount required. If the food is thoroughly masticated and insalivated, as already said, a lesser amount is required than if the food is swallowed without proper mastication.

The distribution of the food consumed during twenty-four hours can be varied considerably according to constitution, state of health, occupation, social custom and personal habits. Some strong persons can take all their



food at one meal, others require only two, but the majority feel best with three, and some do not feel well with less than five, the latter is especially the case during convalescence from acute disease and in neurasthenics and weakly subjects. Some persons maintain that there ought to be no regular hours for meals, but that food ought only to be taken when there is a feeling of hunger. This may be satisfactory for independent people who live alone or need only think of themselves, but those occupied in offices or manufactories or who live in families must take their meals according to convenience.

On the much-debated and all-important question of *alcohol*, I will try to be as short as possible. Alcohol, says Sir Frederick Treves [72], is a poison, and it certainly is so when taken in large quantities, and to some persons even in small quantities. *Alcohol is not necessary* to healthy persons, and most of them would be better without it. Many diseases of the liver, the kidneys, the brain, the blood-vessels (arterio-sclerosis) and other organs, are, no doubt, produced by the abuse of alcohol; many promising lives are destroyed by it; it is the most frequent cause of *crime* and of the ruin, not only of the drinkers themselves, but of their families and their progeny. The mind is perverted by it, and the sense of veracity and morality is destroyed. The great and early mortality amongst public-house keepers is well-known, and is so general amongst all those who are engaged in the liquor-traffic, that Insurance Offices either decline their lives, or take them only exceptionally and then only at very high premiums. The records of Insurance Offices further show



that the lives of total abstainers are longer than those of non-abstainers. Quite recently Mr. T. P. Whitaker [81], in a carefully arranged paper read before the Life Assurance Medical Officers' Association (on January 6th, 1904), has shown that, "other things being equal," the abstainers from alcoholic beverages have a much lower mortality than the non-abstainers and the general average lives, including abstainers and non-abstainers. It is important to notice that the term "non-abstainers" includes only moderate drinkers, for the intemperate are altogether excluded from life assurance. Mr. Whitaker is fully entitled to the inference that abstinence from alcoholic beverages is conducive to health and longevity.

The regular use of alcoholic stimulants by *young persons* is especially dangerous, and ought to be counteracted at school as well as at home, since it stunts complete development and leads often to the habit of taking in adult life more than is conducive to happiness and a healthy old age, and in not a few to excessive drinking and to all its deleterious effects on mind and morals.

Alcohol, like other poisons, can be used as a medicine temporarily in various states of exhaustion ; on this point I must not enter at present.

It is the habit with some persons of judging the influence of alcoholic stimulants on the constitution merely by the amount of alcohol which they contain. This, however, is not correct. The other constituents of these beverages ought likewise to be taken into consideration. The fermentation of the sugar by which the alcohol is produced, is in many liquids combined with the production of



other substances, which depend partly on the composition of the original liquid, but partly on other circumstances in the process of manufacture, such, for instance, as the temperature. Alcoholic fluids containing a considerable amount of sugar, dextrine, hop extract, albuminous matter, salts, vegetable acids, and free carbonic acid and other substances, such as different kinds of beer, have not the same effects on the digestive organs, the nervous system and the organs of circulation as fluids which are more or less pure, more or less diluted solutions of alcohol, such as whisky, gin, brandy, &c. *Beer*, owing to the purin bodies which it contains, disposes persons who take it regularly to rheumatic and gouty complaints, and by the sugar and dextrine to stoutness and the disadvantages and dangers attending it. The difference in the composition of different kinds of beer and in their action on the body is considerable.

Professor Baeumler [46] further directs attention to the fact that persons consuming large quantities of beer mechanically overtax their blood-vessels by keeping them in a state of distension, which gradually leads to disease of the small arteries and later on also of the heart, the work of which becomes additionally more and more increased by the morbid state of the blood-vessels. My own experience amply corroborates Baeumler's view. Between 1850 and 1870 many young Germans engaged in the sugar-baking trade in the East End of London, came to the German Hospital suffering from various diseases, due partly to the excessive heat to which they were exposed from morning till night, partly and even more commonly



so to the almost incredible amount of small beer (eight to twelve gallons per day) which they took to quench their thirst; dilatation of the heart and hydræmia very frequently occurred, and in one man, scarcely 30 years of age, extensive atheroma of arteries, especially those of the brain.

A very prevalent idea with regard to alcohol is that it is most useful to aged people, in fact, that "wine is the milk of old people," that it does for them what milk does for children. This doctrine is dangerous, in so far as it induces some old people to take alcohol in rather large quantities with injurious effects; it is, besides, erroneous, and almost all old people who have been accustomed in their younger days to much wine, and have taken it without apparent harm, find out for themselves that they cannot any longer take the same quantity without suffering for it.

Alcohol habitually taken in any large quantity injures, in most persons, the arteries and capillaries, the brain and nerve-fibres. It is well known that alcohol interferes with the cell-growth, especially in the liver, and partly through this deteriorates the metabolism and the transformation of the purin bodies into urea. It diminishes the resisting power of the organism against chills, microbes and other causes of disease, and this resisting power is one of the great agents in the prolongation of life, and ought to be strengthened in every possible way, not weakened. We hear often that alcohol is not injurious if taken only in *moderation*, but it is the interpretation of the word which is fraught with so much danger. Many persons consider themselves moderate, if they never become drunk; some



take 5 or 6 glasses of sherry or port in the twenty-four hours, or 2 to 3 pints of beer, or 3 or 4 glasses of brandy or whisky, and consider themselves moderate. This is a very dangerous kind of moderation to the majority of people, while in reality an occasional though rare inebriation with intermediate abstemiousness is less injurious than the regular use of the amount of stimulants just mentioned. *The slow and insidious manner in which the regular drinking of so-called moderate, but in reality immoderate, quantities acts, is one of the causes of the frequency and danger of this error.* The fourth part of the quantity mentioned above is what we could call moderation permissible to the majority of persons. It is a common fallacy to think that alcohol stimulates the brain and enables the mind to work more quickly, and the body to undergo greater fatigue. Sir Victor Horsley [326] has forcibly shown that there is no foundation whatever for this view, and refers to Professor Kraepelin's scientific experiments, proving that alcohol even in small quantities interferes with the highest functions of the brain, that it abrogates the controlling power of the brain and cerebellum. The increased action of the brain which is produced in some persons by alcohol is only of very short duration, and is rapidly followed by impaired and deranged action. Sir Victor Horsley points to the analogous action of some anæsthetics. I have stated above the quantity which may be considered as moderate, and which has a beneficial action on some old people in certain morbid affections, for instance, chronic bronchitis, as Dr. Savill [66] found in the aged inmates of a workhouse-infirmity.



### *On Means for the Prolongation of Life*

Here, again, habit is to be consulted, and old persons accustomed for many years to a certain, originally unnecessary, amount of alcohol ought not to be deprived of it all at once, but only by degrees. For a careful consideration of the question of alcohol I refer to the chapter on stimulants in Sir Lauder Brunton's volume on "Disorders of Assimilation, &c." [8].

Persons with small amounts of albumen in the urine, combined with signs of arterio-sclerosis, can by great restriction in alcohol and meat, prolong their lives considerably. The majority of them, however, are disinclined to do so, and are inclined to misinterpret the advice of their doctors, if not precisely given, in favour of their own inclinations. It has repeatedly occurred to me, that when I told such persons that great restriction was necessary, they answered that Doctor X. considered such restriction quite unnecessary, that he said they were perfectly safe with only "a few glasses" of wine at lunch and dinner, and a moderate quantity of meat. They felt perfect security after this advice, and took their few glasses and died within two or three years, while they might have lived much longer with abstinence from alcohol and great restriction in meat food. Their feeling of security reminded me strongly of the words of Hecate in "Macbeth," which are so often applicable in life.

"And you all know, security  
Is mortal's greatest enemy."

Sir Isambard Owen has given a careful analysis of the results of the Collective Investigation Returns, comprising 4,284 persons ; and shows that the average duration of life



was greatest in the total abstainers and very moderate drinkers, and that only few hard drinkers were amongst the long-lived (*British Medical Journal*, June 23, 1888, p. 1312).

Before leaving the subject of alcohol, it may be useful again to allude to the erroneous idea that many persons when giving up the use of alcohol think they may eat as much as they like, and may drink at meals as much common water or "table waters" as they desire. This misconception is, as I have already said, fraught with great danger, leading, as it does, in most cases to obesity, to weakness of the heart, to degeneration of the blood-vessels (arterio-sclerosis), to dropsy, to gout, and in all to premature death; the effect is much more injurious than the moderate use of meat and alcohol at meals.

Amongst the food accessories, *tea* is regarded by the majority of people as an agreeable, useful and harmless stimulant. When taken in moderate quantity and strength it exercises a pleasant effect on the nervous system, especially in physical or mental fatigue, and is not injurious to the majority; but in some persons, particularly amongst those affected with dyspepsia and heart weakness, it produces development of gas, disturbance of the heart and the nervous system. The habit, which exists especially amongst some of the poorer classes, to take four or five meals of strong tea with inadequate food, is no doubt injurious; it causes deterioration of the digestive organs, imperfect nutrition of the heart, degeneration of the small blood-vessels, malnutrition of the whole body,—effects which in most persons develop themselves only slowly. The slow and insidious way of its action



renders the abuse more common. When, however, some authorities condemn tea entirely as a poison, and class it together with the eating of large quantities of meat or the immoderate consumption of alcoholic stimulants as a most potent producer of gout, we are not prepared to accept their view, provided the consumption of it is moderate and the making of it judicious. It is true that the tea leaves (Haig [29 and 30] and Hutchison [35]) contain a certain amount of purin (methyl-purin), but if the quantity of tea consumed during twenty-four hours does not exceed 60 to 90 grains, if it is not allowed to stand long, this can scarcely be regarded as a serious danger, barring a small number of exceptional cases. We have not seen much real gout amongst great tea drinkers, if they were at the same time moderate with regard to meat and alcohol. Tea, Sir Wm. Roberts says, is an inhibitor of salivary digestion, probably through the tannin contained in it [64]. Black teas agree with most persons better than green teas, and good qualities of Chinese teas better than Indian teas. The latter ought to be taken at all events in smaller quantities than the former, or mixed with them in the proportion of one part of Indian to two or three of Chinese. Tea ought not to be boiled, but only infused with boiling water, and the infusion ought not to stand longer than two to four minutes, or at the outside, five. Those who condemn tea do not seem to consider that many persons who take tea as a stimulant save themselves through this from the abuse of alcoholic stimulants, which is infinitely more injurious



than even rather excessive tea drinking. We may further add that the Japanese take tea four or five times a day, and certainly are not as much injured by this habit as many Europeans are by alcohol. Finally, we must not forget that the abuse of alcohol deranges the moral condition of the mind and is the most frequent cause of crime, which no one can say of tea drinking, by which at all events others are not injured.

*Coffee* contains, in addition to *caffein*, which has the same properties of thein, a volatile oil developed by the process of roasting, some cellulose and extractive material (Parkes [59], Koenig [40] and Hutchison [35]). The infusion acts on most people in the same way as tea; but in some cases it causes indigestion and tendency to piles when they take it habitually, while they can take tea without harm. Many, on the other side, of those in whom tea produces flatulence and faintness, bear coffee quite well. Coffee likewise has an inhibitory effect on stomach digestion, and black coffee after meals ought therefore to be avoided by dyspeptics with slow digestion. Parkes had a high opinion of the value of coffee for soldiers undergoing fatigue, and in severe Alpine climbing I have found coffee, on others as well as myself, more effective than tea.

This property, however, of enabling persons to bear extra fatigue, which tea shares with coffee, leads occasionally into danger. We have often observed that under their influence not only physical, but also, and perhaps more frequently, mental over-exertion was persisted in for weeks and months, until it led to exhaustion of the



nervous system, which sometimes lasted through life. Working for scholarships, for instance, and for competitive examinations, has in this way led to sad failures in life.

To the use of coffee similar objections are being made as to that of tea, with regard to uric acid and troubles connected with it. It is impossible for me to discuss them; but I may say that my line of argument would be about the same as that on tea, and my advice is, likewise, moderation. The habit of German ladies to take much coffee in the afternoon has often been mentioned as a cause of many troubles, but probably the cakes taken with the coffee have something to answer for.

*Cocoa* (Hutchison [35]) is different in composition and action from either tea or coffee, although theobromin is chemically almost identical with thein and caffein. The beans contain a large proportion of fat, in addition to other non-nitrogenous and nitrogenous substances. The cocoa prepared from cocoa shells and nibs is better borne by most persons than that prepared from the finely powdered kernel, which disagrees with some on account of the large amount of fat. The ordinary chocolate is mostly mixed with much sugar, which is a disadvantage to some dyspeptics. Cocoa and chocolate are much more articles of food than tea and coffee, and have great sustaining power in fatiguing climbs and other exertions. As cocoa is mostly taken with much milk, it becomes a real meal. An instructive chapter on tea, coffee and cocoa, is contributed to the "Book of Health," by Sir Lauder Brunton, and may be also consulted in "Disorders of Assimilation and Digestion" [8].



*Tobacco* is to many persons a means of enjoyment and is well borne by them if they take it with great moderation, for instance, only one cigar after dinner or three to four cigarettes in the twenty-four hours; it soothes nervous irritability, and makes men often look more contentedly on their troubles. On the other hand, excessive smoking is decidedly injurious to the majority of people by affecting the heart, the small blood-vessels, the digestion, the nervous system and the throat. In many cases diminution of the amount of smoking, or taking a milder kind of tobacco, remedies the bad effects; in some, however, the use of tobacco has to be given up entirely. Smoking with an empty stomach is more injurious than smoking after meals. Boys and girls, before they are grown up, ought not to be permitted to smoke, as it prevents perfect development. There are good observers, amongst them Professor Lazarus of Berlin, who regard excessive smoking as one of the causes of arterio-sclerosis, and when we consider the effect of tobacco on the heart in some people, it appears probable that the smaller blood-vessels are likewise injuriously influenced by it. In this connection we may allude also to a paper by Dr. Michels and Dr. Parkes Weber "On Arteritis Obliterans" (45 and 75). The patients were Russian and Roumanian Jews between thirty and forty, who were free from other morbid complications, but had in common: (1) that they smoked every day many cigarettes, (2) that they had poor food, and probably insufficient in quantity, and (3) that they consumed a large quantity of strong tea. It is to the immoderate smoking that I am inclined to attribute



the disease of the arteries, though possibly one of the other points — viz., abuse of strong tea, may have produced a predisposition. I may add, however, that tea can probably be excluded, the more so as Professor Israel, of Berlin, has communicated other cases of this disease occurring in Eastern Jews in the prime of life, who lived in Eastern Europe, where tea-drinking is not the custom amongst the poorer classes.

*Snuff* is out of fashion at present ; but to some people suffering from chronic catarrh of the nose, with insufficient secretion of mucus, a pinch, taken once or twice a day, is useful by increasing the discharge and rendering the breathing through the nose more easy, and also by maintaining to a certain degree the sense of smell ; it seems to act by its stimulation as a species of gymnastics on the capillaries of the Schneiderian membrane. Many old doctors maintained that snuff-taking was a good practice against some forms of frontal headache and blear-eyes, and this not without reason.

An important matter with regard to the digestive system is the *action of the bowels*. There are great differences in this respect with different persons ; many only feel well if they have one or two evacuations daily, and even more, and they mostly have them without being obliged to pay any attention to the nature of their food ; others have a motion only every second and even third day, without suffering in health. On the other side, there are many persons who have great difficulty in this function ; they go for three and four days and longer ; some do so without feeling inconvenience, but in the



majority, in course of time the health is disturbed by this habitual constipation, especially by interfering with the portal circulation, by causing piles, and by the absorption of ptomaines. Constipation is also not rarely the cause of anæmia. A great point is to accustom the bowels to a regular action at a certain time of the day, a habit which ought to be cultivated from childhood; the morning, if possible, excepting in persons affected with piles, to whom the evacuation of the bowels at bedtime is more useful, since by rest in the recumbent position after the motion the lower part of the bowel returns to its natural position, and the hæmorrhoidal vessels become relieved. The quantity and quality of food are of great importance to persons with sluggish bowels. With many people the intestines are so torpid that the stimulus of ordinary food is not sufficient to make them act. They require substances which cause a certain amount of local mechanical stimulation, such as is produced by the bran of brown or whole-meal bread, and the fibres of green vegetables. Sir Lauder Brunton explained this in a practical lecture on constipation some years ago. The best brown bread, in my experience, is the whole-meal bread recommended by Sir Henry Thompson, which is a modification of the ordinary brown bread, or Graham bread, and for travelling, Spiking's or Hill's whole-meal biscuits may be substituted. The best qualities of Smyrna figs are likewise useful, partly no doubt by the seeds they contain, but partly also by the other portion of the pulp. A large part of the food of such people ought to consist of green vegetables, and some fruit such as apples, either baked



or, if they are tender and can be easily and completely masticated, raw; in this state they have with many persons a greater influence on the action of the bowels than when cooked. Some persons with tendency to constipation are perfectly regular when they take two fair-sized soft apples at breakfast or lunch, while others prefer bedtime.

There are many people who think that it is better to take only the nourishing parts of food, which are in their opinion more digestible, and save their digestive organs the labour of extracting them; they prefer meat extracts to meat, fruit jellies to the whole fruit, the finest flour to the entire wheat meal; but this is for most persons a great mistake, not only on account of the reason given just now, viz., the slight stimulation caused by the vegetable fibres and other solid parts, but also because the stomach and intestines ought to be kept at work like all other organs of the body, provided they are free from ulceration, catarrhal affection or other disease. Furthermore, the natural substances are more useful than the extracts; the entire meat is more nourishing than extracts of meat, which do not make muscle though they foster gout; the very fine white bread is inferior in its nutritious qualities to the bread made from the entire flour, the whole-meal bread or any good household bread, excepting some persons for whom it is necessary to avoid food containing purin as much as possible. For these the finest white bread is preferable, since it is almost free from purin, while the whole-meal bread contains a certain amount of it.

If the arrangement of food is not sufficient to produce regular action of the bowels, massage of the abdominal



organs is in many people a satisfactory measure, and almost every individual can learn to practise this on himself. Another help, and a very useful one, not only with regard to the motion of the bowels, is the voluntary and systematic contraction of the muscles of the abdominal wall, the *abdominal pressure* (*Bauch Presse* of the Germans). By slowly and thoroughly contracting the abdominal muscles from above downward fifty or sixty times, and by keeping them in contraction during full and prolonged expiration, not only the intestines, but also the liver, the bowels, the blood-vessels, and all the organs within the abdominal cavity are compressed, the entire abdominal circulation is activated, the blood squeezed out of the veins and moved on toward the heart, which is strengthened by the extra work which it has to perform, as well as the abdominal muscles themselves. A glass of hot or cold water, or of some ærated table water like Seltzer or Apollinaris or Giesshübler, or a cup of weak tea taken about one to two hours before breakfast, has often the desired effect; in others a ride on horseback before breakfast, or a brisk walk. A wet bandage round the stomach and loins, worn during the night, is likewise often a successful measure. If by all these helps the regular action of the bowels cannot be obtained, and if the health of the individual suffers in consequence, mild aperients become to some persons a necessity, especially to gouty people, as the tendency to imperfect removal of excretory matters is mostly part of their constitution, and may lead to various deviations from health, and ultimately shorten life. Many people, how-



ever, always take aperients without requiring them, and live in constant fear of constipation; a kind of hypochondriasis. They ought to bear in mind what I have already alluded to, that to many persons it is sufficient to have a motion only every other day, and even more rarely. It is further important to consider that the amount and nature of food and the way of taking it exercise great influence on the frequency or rarity and on the abundance or paucity of motions. If a large quantity of food containing much insoluble vegetable fibre is consumed, a greater amount of substance must be evacuated by the bowels; but if only a moderate amount of food is taken, the greatest part of which can be dissolved and absorbed in the intestines, only a small amount remains for evacuation through the stools, and the motions must be less frequent and less bulky. The way in which the food is taken exercises likewise great influence; by the process of cooking the fibrous parts of the food are softened, the saliva and gastric juice are allowed to act on it, and absorption is promoted. Equally important and in some respects more so is thorough mastication, by which, combined with the admixture of saliva in the mouth, a much larger amount of nourishing material becomes absorbable and is absorbed in the intestines, a smaller quantity of the original food substance remains, the evacuations must be diminished in quantity and need not occur every day (Dr. van Somering [73] and Horace Fletcher [26]).

Equally important with the organs of circulation and digestion is *the nervous system*, which, we may say, governs all the other systems. We must therefore pre-



vent its degeneration as long as possible; we must nourish it and keep it in action. The state of the blood-vessels and the circulation are again all-important. Degeneration of the blood-vessels of the brain, and the impairment of the brain structure and functions consequent on it, form a frequent cause of premature decay and death; and the tendency to this degeneration is in many families hereditary, but this premature decay is to a great degree preventable by moderation in food and stimulants, by regular physical exercise, and by judiciously arranged mental work and occupation. I have often witnessed this, and in a very striking way, in a family whose male members had for several generations died between 56 and 64 from apoplexy, or paralysis, or other early decay of the brain. Of five brothers in this family who came under my observation when between 25 and 40 years of age, two carried out the advice to lead an active life, mentally and physically, coupled with moderation in everything, and lived to beyond 70 and 73 years, and died not from degeneration of the brain, but from heart affection and pneumonia; while the three others, with less active and less temperate habits, and too much sleep, died between 60 and 64 from paralysis and apoplexy. I could adduce many similar experiences in other families, though perhaps less striking.

The *brain* profits like all the other organs of the body by physical exercise, in so far as through the increased action of the heart more blood is carried to it, and the nerve-cells as well as the arterioles and capillaries are kept in a healthy condition. Exercise, however, produces



another and more immediate influence on the nutrition of the brain. As every voluntary movement is due to an impulse from certain portions of the brain, this impulse, we may assume, causes an increased afflux of blood, through which, as well the nerve-cells as the small blood-vessels themselves are nourished and kept in working condition, counteracting premature decay. The brain often decays from want of physical exercise or mental work. We have frequent opportunities of witnessing this. Many men retire rather too early from business ; others, especially officers in the navy or army and civil servants, are obliged to do so by the regulations. Amongst these men we see not rarely weariness, dejection and an inclination to give up occupation and active habits, to remain longer in bed, to play cards by day and night, to smoke immoderately and sit longer over their meals, and in consequence sickness of different kinds and also premature decay of the brain functions. Such men ought to find occupation for their brains and regular bodily exercise. They ought to seek some objects of interest in art or in literature, in studying the habits of insects or birds, in history, geography, geology, zoology, botany, in gardening or agriculture, in travelling, or in adopting and educating a child, and in other philanthropic matters, &c. ; they ought to cultivate a hobby, for instance, in collecting prints, autographs, antiquities or coins, which induce them to study history, antiquity and mythology ; even the collecting of postage stamps, in default of something else, can be used as a source of mental occupation. The cultivation of a hobby ought to be commenced already while people are



still at active work, since the inclination and the aptitude to begin something new disappears not rarely long before 60 or 65, when they have to retire from their work. Many old people derive great benefit from chess and other intellectual games, also from games at cards or dominoes, especially when the eyesight for reading fails, provided over-excitement or passion is avoided. The families or companions of old people ought therefore to play with them, or otherwise occupy them, instead of allowing them to go to sleep for several hours during the day or the long evenings. Amongst the classes of people who die earlier than they ought to do from imperfect brain work are some who had lived a healthy life up to 50 and 60, but then began to fail, from want of activity. I have observed this, for instance, amongst farmers, who, when they ceased to be able to take the long walks and rides necessary to superintend their farms, allowed their work to be done by their sons, indulged however in the comparatively large amount of food to which they had been accustomed, spent the greater part of the day during the long winters indoors, became stiff in their limbs, sleepy and indolent, and died between 68 and 75. This may be called a respectable age, but it is not the age which they would have attained if they had sufficiently occupied their minds, diminished the amount of food, and kept up out-of-door life and exercise. Similar observations I have made amongst well-to-do tradesmen and other classes, to which I have already alluded. A great point is to keep up *variety in mental occupations* and to keep awake the interest in many things so as to prevent mental torpor, which is akin to ossification of cartilages or



arteries. All mental occupation leads to increase of flow of blood to the brain, activity of the small blood-vessels and nutrition of the nerve-cells. I have already mentioned Mosso's experiment (p. 16) [47]. I could produce the most remarkable proofs of the influence of mental activity on the condition of the heart, the digestion and the whole body. I cannot resist mentioning a very striking case which I had the opportunity of watching from day to day, as the subject was an intimate friend of mine. A man of great energy and intelligence who was the leading spirit in a well-known hospital, began to become languid and to lose his interest in his work at the age of 76. The action of his heart became weak and very irregular, he lost the expression of intelligence peculiar to him, the saliva ran constantly from his mouth and a viscid and acrid fluid from his swollen eyes; the action of the bowels and the bladder became extremely sluggish; oedema of the legs, and at last effusion into the pleural cavities, developed themselves in his 82nd year, when suddenly the arrangements which he had created at the hospital were in danger of being overturned. This caused violent excitement in him; he began at first to dictate and soon to write letters, he held meetings, and succeeded in saving his arrangements and his influence. Marvellous was the improvement manifesting itself from day to day without any medicine. The pleural effusion and oedema disappeared, the heart became almost regular, the eyes and mouth returned to their natural conditions, the puffiness of the face subsided, and the intelligent expression came back. He remained in this improved condition over a year, when he died of pneumonia, from



a deleterious meteorological change, or influenza. It was the work of the brain and the joy at his success which caused this astonishing improvement. Wonderful is the effect of success, and equally so that of joy; it shows the immense power of the mental condition over the whole organism. The opposite conditions of the mind, such as grief and loss of hope, cause in some people the greatest mental and physical depression, total indifference for their surroundings, combined with at first functional, afterwards organic changes, especially dilatation of the heart, and death from what may truly be called a "*broken heart*." Diminished respiration, weakening of the action of the heart and imperfect supply of blood to the brain, probably have a great share in these conditions of depression. Sometimes, but not always, we are able to produce a favourable turning in such cases by awakening an interest in near relatives or friends, or by some other powerful mental influence, which is followed by arousing the depressed functions of the brain, the heart and the rest of the body. Of many cases of this kind which have occurred to me, I will narrate only one: A lady, 70 years of age, lost suddenly from acute disease her husband, a very distinguished physician, whom she had adored, and with whom she had shared every pleasure and every sorrow throughout their long happy union. She was highly cultivated, very active, and took a lively interest in all her surroundings. Immediately after the unexpected death of her husband she became mentally depressed and perfectly helpless, while formerly she had been full of resources. The condition might be called "*mental paralysis*" or acute



melancholia. It was almost impossible to induce her to take food, she almost always sat in a corner of the room with her head bent down, frequently sighing, and took scarcely any notice of the members of her family, of whom she had always been very fond. Within less than three weeks the heart, which had been quite sound, had become dilated, the pulse had become weak and irregular, and a loud systolic mitral bruit had developed. The legs had become œdematous. The intellectual and sympathetic physiognomy had turned into an expression of apathy and almost stupor. This state continued and increased for some weeks; she became greatly emaciated and was expected shortly to die, when as a last experiment an urgent message was sent to her from a daughter who had not been able to leave her bed for several years, and had entirely depended on her. The daughter implored her to see her once more before she died; the mother was carried to her, and her maternal interest and affection were roused by the daughter's helplessness and grief and attachment. She took some food and stimulant with her, and she revived from that moment, was daily carried to this invalid daughter, whose joy at her mother's arrival seemed to act as a powerful stimulus on the latter, who gradually regained also her interest in other members of the family. The aged lady recovered her general health in the course of three months, although the heart remained somewhat dilated and irregular; she became again the centre and soul of her large family, and retained her faculties to her death, in her 86th year.



It may not be quite easy to explain the physical mode of action of happiness and allied mental conditions on the one side, and dejection and unhappiness on the other. Both act on the heart and circulation, the former stimulating, the latter depressing, but the mind is no doubt first influenced, and through it the heart and lungs. On watching persons under despondency and grief, I have often found their breathing superficial and irregular, interrupted occasionally by a sigh, and their pulse weaker and less frequent from imperfect action of heart, while under the influence of joyful news the breathing became regular and deeper, and the pulse fuller, rising within half an hour from 50 to 70 and 75, its habitual rate of frequency; evidently the centre of the pneumogastric nerve is influenced by these opposite forms of emotion. It is often impossible to remove sorrow, grief, mental anxiety and depression by friendly encouragement, but we must endeavour under such circumstances to counteract these injurious agencies by physical means, and exercise, active or passive (in carriage or bath-chair), in the open air is one of the most powerful agencies, and rarely fails gradually to exert its beneficial influence.

In order to promote *cheerfulness* we must cultivate *contentedness* with the circumstances in which we are placed; it is, further, of great importance to educate the *sense of duty* with regard to one's position in life and to one's surroundings. A person who does his duty and through this is satisfied with himself, in other words, has a good *conscience*, is, other matters being satisfactory, happy, and even if they are not to his liking, he is able to keep his



equanimity and to bear them well. On the other hand a man who has reason to be dissatisfied with himself, or has a bad conscience, is unhappy ; he looks at the circumstances surrounding him in a despondent manner, and is less able to extricate himself out of a difficulty ; he often becomes depressed, his resisting power is lowered, and he is easily attacked by disease. The sense of duty ought therefore to be cultivated from an early age through life. The head of the family, for instance, who neglects the happiness of his wife and the training of his children for his personal enjoyment, and a wife who shirks her duty of bearing children and of nursing them for frivolous motives, fine clothes and social excitement, often prepare for themselves worry, disease and premature death. In several instances of my experience it has happened that parents who, in the earlier years of their married lives had by their own will limited their progeny to one child, lost this only child after it had grown up. It had been the bond of union between them and the centre of their happiness. The death of this only child caused them the greatest unhappiness ; in one case deep melancholy of the wife, in another estrangement between husband and wife for the remainder of their lives ; in another suicide. Again and again Goethe's words came before my mind :—

“Denn alle Schuld raecht sich auf Erden.”

(“For vengeance follows on the guilty deed.”)

*Free translation.*

On the other hand, those who bear sacrifices for home and family, for the alleviation and improvement of the con-



dition of the sick and helpless with whom they come in contact, earn mental satisfaction and happiness, which act like sunshine on the whole body, and thus become means of prolongation of life and of a happy old age. A further point of self-education connected with the sense of duty, is the restraint of our passions; not only must we not allow ourselves to become furious if any thing displeases us, but we must also conquer ambition, vanity, avarice, jealousy, illicit sexual desires, which often become, as you know, the cause of bodily and mental disease, premature death or "miserable" old age.

A further powerful agent in health matters is *the will*. We must develop it from youth and cultivate it throughout life. A large proportion of those whose lives I have been able to prolong exercised their strong will in carrying out the precepts which I gave them, although they appeared to them at first tedious and difficult. *I will not decay early*, they said, *I will maintain my powers and faculties* as long as possible. And not only is a strong will a great aid in attaining longevity by maintaining health and preventing disease, but it is also a powerful agent in overcoming disease. This is generally acknowledged with regard to pulmonary tuberculosis, but I have also seen many, and amongst them some marvellous cases in other diseases. A man, for instance, above 60, who had suffered for more than eighteen months from a weak and dilated heart, from cirrhosis of the liver, œdema of the legs, and ascites, and had been tapped seven times, was scarcely ever free from pain and from a sense of exhaustion; he was justly refused by a Life Assurance Society and was told



that his chances of recovery were doubtful. At first he was much depressed by this pessimistic prognosis, but on the following day he said that he must live on account of his large family, that he would not die and would do everything in his power to prevent death. He began to carry out my advice, however difficult it was to him, with regard to food, open-air life, different kinds of exercise, and change of climate; he regained his health within two years and remained well up to a considerable age. Even in children the will exercises sometimes a remarkable influence on the course of disease. Thus I still see before me a pale and breathless child of seven years of age who had pleuropneumonia, and was suspected to have tubercles in the lungs. After a consultation between three physicians the mother had been told that there was only a very slight chance of recovery. When I afterwards came into the sick room, I found the mother unable to suppress her tears, and the child almost breathless exclaiming: "Don't cry, mummy dear, I shall get well again, I will not die." An improvement set in almost from that hour; slight at first, it became more decided after some days, leading gradually to perfect recovery. This child gained with advancing years many other advantages from a strong will. Such occurrences, I know, may be regarded as coincidences only, and not as due to the will; but as I have observed several cases of a similar nature, I am convinced that the will of the patient has had a great share in the successful issue. The will is, indeed, a great power, in disease as well as in other events of a man's life.

These considerations bring us to the borders of *mental*



*diseases*, which often, though not always, shorten life. In many cases there is a hereditary tendency, but this can mostly be counteracted successfully by strengthening the balance of the mind, and it is our duty to do so from childhood by healthy occupation and exercise, by enlightened mental surroundings, by great moderation, by promoting the general health, by cultivating contentedness, by governing the passions, while at the same time all exciting causes must be kept off as far as possible. While I write this a very suggestive paper by Sir Samuel Wilks comes before me, "On the Correction of Hereditary Tendencies" (*Lancet*, October, 1903, p. 1151). He occupied himself with the hereditary tendency to vice, but his suggestions apply also to other forms of mental irregularities; he especially points out as means of cure, change of mental surroundings, from the houses of vicious parents or relatives to healthy surroundings or schools, where the qualities of self-respect, integrity, independence, and a just dealing with others are brought out. Lord Bacon, in his "Advancement of Learning," speaks of particular remedies "which learning doth minister to all the diseases of the mind."

Under the head of the nervous system we must pay some attention *to sleep*, that most wonderful function of our organism. Dr. Oliver points out [55] that during sleep the arterial pressure falls, the venous rises, and that during sleep the tissues are irrigated with lymph, which leads to their restoration and nutrition. The amount of sleep required differs very much in different people and at different ages, and even in the same persons at different



times and under different circumstances. Children and young persons at school require much more than adults. Sleep promotes with them nutrition and growth ; it is to them the "great nourisher in life's feast." Most adults do not require more than five and a half to seven hours, but some take nine hours and over. Much depends on the nature of occupation and on habit, and there are in this matter, too, good and bad habits. Sleeping for one or many months too little, say under five or six hours between 8 and 14 years of age, and four hours in adults, causes in many persons imperfect digestion, sanguification and nutrition, emaciation, anæmia, mental irritability, neuralgia, and other troubles of the nervous system. This is easily understood when we take Oliver's experience just mentioned into consideration, from which we see that too little sleep gives not time enough for the process of nutrition of the tissues. Oliver's experience also shows why during active growth much more sleep is required than in the later stages of life, when the body is thoroughly developed, and why the curtailing of sleep in children and growing persons is so much more injurious than in adult life. The habit of sleeping too little is, however, less frequent than that of sleeping too much. There are some hard brain-workers who never sleep more than five hours and even less, and enjoy good health with this small amount up to old age, if they live otherwise correctly. There are many persons who worry themselves if they sleep less than seven hours and if they wake several times during the night. They mostly do themselves more harm by worrying about the sup-



posed too short hours of sleep, than by the small amount of sleep they get; if they can be persuaded that they are not injured by the shorter hours, that rest in bed by itself leads to restoration of the body, they mostly begin to sleep better. Other persons on waking during the night, immediately turn their thoughts to their occupations or worries, and as everything looks blacker during the night than in broad daylight, they dread this so much that they take alcoholic drinks or sleeping drugs either on going to bed or during the night as soon as they wake up. This is a very bad habit and ought never to be resorted to excepting under the well considered advice of the doctor. The frequent use of anodynes and sleeping remedies weakens the heart, the nervous system, often also the digestion and the resisting power. The tendency to sleep badly can often be corrected by taking a slight meal on going to bed, or on waking during the night, such as milk, a plain biscuit, or some light farinaceous food, but not alcohol. In some persons too late a meal, or injudicious articles of food, or coffee or tea at a late hour, form the causes of imperfect sleep, and must be avoided. In other persons, insufficient bodily exercise is the cause; in others exciting mental work at late hours. In every case one must endeavour to find out the cause and try to remove it. In some cases a warm bath at bedtime, in others a cold bath, and again in others a wet bandage round the stomach, furnish good remedies against imperfect sleep. Much sleep, viz., over eight hours—I speak here of adults—is often as injurious as too little and perhaps more so, especially in persons of full habits, by



causing diminution of nervous energy, or degeneration of the small arteries or capillaries of the brain, and in consequence apoplexy or premature decay of mental faculties. Dr. Oliver's experience just quoted explains this deterioration, which is often manifested by the appearance of plethora and by obesity. Immanuel Kant, who was not only a great philosopher but had also very judicious views about health and most matters of life, says that much sleep exhausts the energy and shortens life [37].

Sir John Sinclair [67], in his excellent and most diligently compiled work says: "It is proper to add, that nothing is more pernicious than too much sleep. It brings on a sluggishness and dulness of all the animal functions, and materially tends to weaken the body. It blunts and destroys the senses, and renders both the body and the mind unfit for action. From the slowness of the circulation which it occasions, there necessarily follows great corpulency, a bloated habit of body, and a tendency to dropsy, lethargy, apoplexy, and other disorders."

The time for sleep is the night, and sleep during the day, which is so necessary for infants, ought not to be indulged in by healthy persons in the middle of life and only very moderately by old people, barring exceptions, as for instance after illness, or exhausting work. It is a bad habit to transform the night into day and the day into night, to do mental or social work after midnight and to sleep in the morning until 9 or 10 and even later. With few exceptions the long-lived reported on and analysed by the "Collective Investigation Committee" (Humphry, "Old Age," p. 53) rose early and



went to bed early, and my own observations are entirely in accordance with this.

At the risk of being blamed by those who maintain that a certain number of hours of sleep, say six to eight, is absolutely necessary, and that it must be taken by day if it cannot be taken at night, I may say that I have always recommended men of work, physical or mental, to rise at the same early hour, even if they had gone to bed later than usual, or had not slept well. There are, I need not say, a few necessary exceptions to this rule, such as men in the House of Commons, if the sittings last till 4 or 5 a.m., or medical men who had to spend the greater part of the night at the bedside of a patient, or delicate ladies, who had to be, owing to our bad habits, at dances till long after midnight, or workers at morning newspapers. It is at present in England the habit of most men occupied with literary work to do it during the late evening hours; they say that they cannot collect their thoughts and bring them into proper shape in the morning, but can do so in the late hours of the evening, and better and better during the small hours of the morning. I acknowledge that it is so, but this is only the consequence of a bad habit, and that for those who accustom themselves to it the morning work is the best, and that this is also more in accordance with the laws of health. Many people it is true cannot work well for several hours in the early morning with an empty stomach; but by taking a cup of milk, or of weak tea with milk and with a piece of bread or a biscuit, they can do their mental work, or take early walks with great advantage. John Wesley, the well-known



divine, it is stated, rose for sixty years every morning at 4 o'clock, and never slept more than six hours. I could give numerous instances of great mental workers who from an early period of life were in the habit of rising always between 5 and 6 o'clock, even if they had been obliged to remain up till after midnight once or twice a week, and who lived and retained their working power in spite of these short hours of sleep to the age of 75 to 80, and even longer. Several judges of my acquaintance, while on duty rise at 4 or 5 and prepare themselves for their work; and one of them is now alive, though lately retired, and enjoys good health at 88.

Before leaving the mental condition and the influence of mental work, I must again express my conviction against the doctrine that under ordinary conditions work wears out the organs sooner than idleness or great restriction in work. It certainly is wrong with regard to healthy brains, if the work is well arranged and is not "overwork." Judiciously arranged mental work in itself, with fair intervals of rest, does not wear out the brain. The mental faculties ought to be exercised during the greater part of the day and the whole year, holidays included, but there ought to be a change in the nature of the work, so that one sphere is in a comparative state of rest while the other is employed. Dr. Pollock [63] says very well: "Sameness begets weariness, causes the mind to grow old and accelerates bodily decay." In the majority of people who practise their mental faculties judiciously, these are retained longer in fair energy than the functions of the muscular and digestive systems, perhaps, as Sir Crichton Browne points



out [18 and 19], because the frontal lobes on which they depend attain their highest development later in life. We find, at all events, statesmen, judges, orators, doing almost their best work after 50 and 60. We have fortunately many instances of great brain-workers attaining considerable ages and maintaining their faculties to the end, in science, in arts, in politics, in the law and divinity, and also in medicine. Hufeland himself, although he supports the wearing out theory, was a hard worker, and lived to 74. Cicero says "the intellectual powers remain in the old, provided study and application are kept up, and old age need not be inactive, indolent and drowsy." We have striking instances in painters, in Titian and in Sidney Cooper; we have amongst other brain-workers, Sophocles, who is said to have written tragedies at 90 and more, Plato, Galen, Cato (Censorious), Cicero, Michael Angelo, Heberden, Wesley, Samuel Rogers, Chevreul, Sir Henry Holland, the physician; William I. of Germany, Moltke, Bismarck, Dr. Holyoke, an American physician (died 100 years old); Leopold von Ranke, Mommsen, Gladstone, Lord Masham, the great inventor in modern industries, our own Emeritus Registrar Sir Henry Pitman, who is alive at 97; Sir Manuel Garcia, the inventor of the laryngoscope, who celebrated his 100th birthday in the early part of the year (1905), and many others, who exercised their brains to the end of their long lives, and probably contributed through this to their longevity. We have on the other hand good reason to assume that neglect of the mental faculties, idleness, excessive amount of sleep, lead to premature decay of the brain functions and to shortening of life.



Many people seem to have been startled by a statement in Professor Osler's Valedictory Address at Johns Hopkins University [56*a*] about the comparative uselessness of men above 60, and that all the effective and vitalising work of the world is done between 25 and 40. His partly jocose remarks seem to have been misinterpreted. I understand Osler's remarks much in the same way as Sir Samuel Wilks does in his philosophical article "De Senectute" [82*a*]. He thinks that the principal activity, we may call it the creative period, ceases in the middle of life, viz., about 50, that, however, judgment and ability to do useful work may last to much more advanced life. To use the words of Sir Samuel Wilks: Men (older than 50) "may still continue to take their appropriate share in the affairs of life. The work which they then do need not be original and new, implying a retention of the same mental activity as they had previously possessed, but rather the turning to account the knowledge which they had previously gained, and so utilising their experiences for the benefit of others as did the Nestors of old" (*Lancet*, 1905, vol. ii., p. 1606).

An important organ, by which the general health and the duration of life are influenced, is the *skin*, one of the various functions of which is the removal of excretory matters. This function, which it performs jointly with other organs, is apt to become defective in old people. The skin of old people is mostly drier than in earlier life, partly no doubt from the obliteration of some of the capillaries. All active exercises help in keeping up the circulation in, and the functions of, the skin,



but one of the most powerful means is the *bath*. Many persons with an active circulation can use cold baths from early life to very old age; others with poor reaction, especially weakly rheumatic subjects, do better with a hot bath; again others begin best with a warm bath and then let in cold water and sluice themselves, head included, thoroughly with cold water, or take a cold shower bath at the end. The hot bath has, in addition to its local effects, an immediate influence on the distribution of blood through the different parts of the body. The heat of the water attracts a large amount of blood to the skin, and diminishes the amount contained in the internal organs. It ought, therefore, not to be taken soon after a principal meal, when the stomach requires a larger amount of blood. This influence on the distribution of blood the hot water bath shares with the hot air bath, the vapour bath, the electric bath. The active rubbing and drying with a rough towel after the bath does not only dry and massage the skin, but obliges the bather to make many movements with the arms and the muscles of the trunk which he would not do otherwise. Thus the bath acts as a kind of gymnastics to the skin itself and induces also gymnastics of the arms. The bath, either cold from the beginning, or first hot and then cold, also assists in maintaining the energy of the nervous system, including even the character, by the shock which it applies to the whole body, and the resolution required to take the cold bath in cold weather. Another advantage of the bath, especially the cold bath, is that it hardens us against chills



by increasing the resisting power. The Japanese have a very high opinion of the usefulness of the daily bath; we are informed by travellers in Japan that every hamlet has its public baths, hot and cold, the former generally preferred.

With the ordinary bath we can conveniently combine an *air bath* by keeping the body uncovered for several minutes after the drying and rubbing process has been finished, while the skin is in a state of turgor or glow. This exposure of the whole body to the action of the air increases the tonic influence of the bath. Various gymnastic exercises can be advantageously combined with this air bath after the water bath. The air bath alone during half an hour and even several hours, improves the condition of the skin, and through it the nervous system and the metabolism. Those who have time and opportunity can, in addition, take a *sun bath*, the action of which is allied to the hot air bath, by exposing the naked body during half an hour and longer to the active rays of the sun. The light and heat of the sun, however, exercise a more powerful influence than the hot air bath alone on the general metabolism, which is especially beneficial in chronic rheumatic ailments. The cures with electric light baths, and hot sand baths are based on similar principles. It is easily understood that the air bath alone without heat abstracts warmth from the body according to the external temperature and the degree of movement of the air, and that the duration of the air bath must be regulated according to these circumstances and the condition of the individual.

A kind of local air bath is supplied by walking and



driving whenever possible with the head uncovered. Many chills which are frequently caused by cold draughts on the head, are through this avoided. The founder of the Blue-Coat School deserves praise for the judicious law to keep the heads of the boys uncovered in all weathers.

If a full bath cannot be managed, a hip bath combined with sluicing the head thoroughly with cold water may be substituted as second best ; and if this, too, is impossible, the whole body ought to be rubbed thoroughly with a wet towel once or twice a day for some minutes, and the head bathed with tepid or cold water and afterwards thoroughly rubbed dry.

Mr. Malcolm Morris has given good advice on the cultivation of the skin in the "Book of Health" [46].

In connection with the skin we must say a few words about the *hair*, which is not a mere appendix or ornament, but also an organ of protection. The hair undergoes, with the advance of age, considerable changes, which are especially noticeable in the hair of the head, including the beard, and which Metchnikoff ascribes to the action of the makrophages. There is a wide difference in different persons with regard to these changes. There are whole families in the members of which the hair begins to turn grey already at 20 or soon after, while in other families the hair retains its original colour up to 60 or 70 or even 80 or the end of life. Similar is the difference with regard to the *loss* of hair which commences in some families before 25, while most members of other families retain their hair up to the most advanced age. The mere change of colour in itself exercises, especially when it is due to a



family peculiarity, no influence on health, but it is sometimes connected with permanent or transitory changes in more vital parts of the body; the rapid change from the natural colour to greyness or whiteness, when it is not the effect of acute disease, is not rarely caused by a deterioration of the whole constitution, and thus requires the serious attention of the doctor.

The *loss of hair* renders some people more liable to the injurious effects of sudden changes of temperature, draughts, &c. In many instances we are able to prevent or at all events to slacken the process of loss of hair, and to some degree also the change of colour, by always keeping the head cool and mostly uncovered, and sponging it regularly with cold water; but a still more beneficial influence is exercised by daily *massage of the head*, which ought to consist not in mere rubbing of the hair and skin of the head, but in actively and rapidly moving the scalp to and from the bone, combined with a certain amount of pressure. By this kind of massage the nutrition of the entire skin is promoted, including the nerves, the capillaries, the rete mucosum, the hair follicles, the sudoriparous and sebiparous glands. This massage, when properly carried out, exercises also a beneficial influence, though perhaps only to a slight degree, on the nutrition of the skull itself, and may thus somewhat counteract the tendency to atrophy of the parietal walls. We have further succeeded in many persons not only in preventing the loss of hair, but also in checking certain forms of headache by this daily massage of the scalp, which may conveniently be practised after or before the bathing of the head.



Considerable additions to our knowledge have been made during the last twenty-five years by the attention paid to the functions of *various glandular organs*, and especially the so-called ductless glands. What we know as yet is still very imperfect, but clinical observation and experiment have already clearly demonstrated that these organs exercise vast influence on the development and on the health of the whole animal organism. This is particularly the case with *the thyroid and parathyroid glands*. The diseases and the extirpation of these organs produce remarkable changes in the whole organism, especially in the functions of the nervous, circulatory and cutaneous systems. As some morbid symptoms observed in old age seem to depend on pathological changes in these glands (Horsley [32a], Ewald [24 and 25], Lorand [42] and others) we must endeavour to maintain them as long as possible in an effective state and avoid their atrophy. This consideration, and especially Kocher's observations on the removal of goitre, have led me to begin many years ago regularly to massage my own thyroid and parathyroid glands, together with the larynx and the anterior part of the neck (the latter with the intention to maintain a healthy condition of the blood-vessels and nerves of this region), and to advise many of my patients to do so. This practice, I think, has been attended with distinct benefit in numerous cases which had manifested symptoms akin to those of myxœdema, such as puffiness of the face and hands, rapid falling out of hair, great dryness of the skin and mental hebetude. The massage of the thyroid and parathyroid region was



gradually followed by the disappearance of these symptoms, and this without the assistance of thyroid extract. The involuntary muscular twitchings of the face and neck and actual convulsions which occur in some old people may be due to senile changes in the parathyroid glands, and these, too, I have seen checked more or less by massage of the laryngeal region.

We are not able to massage all the glands of the body as thoroughly as the thyroid and parathyroid, because most of the others do not lie so near to the surface. The glands situated in the abdominal cavity—the mesenteric glands, the spleen, the liver, the pancreas, the kidneys and suprarenal glands—can to some degree be influenced by massage of the abdomen, but not sufficiently. Some beneficial influence also is exercised by the regular practice of abdominal pressure [p. 64], and also by the respiratory movements which have been previously mentioned when combined with thorough compression of the abdomen. More amenable to this mechanical treatment are the parotid and the submaxillary glands, which in some persons of advanced age lose their natural energy and secrete a viscid fluid instead of healthy saliva.

As the human organism is one whole, in which every single organ is more or less intimately connected with the rest, the health of the whole organism depends on that of every single part. Each single part ought, therefore, to be attended to for the benefit of the whole. It is, however, not in our power to do this efficiently. Thus the *special senses* which exercise great influence on the brain by the impressions which they convey to it, are apt to decay with



advancing years, and our power to prevent this is very limited. By carrying out the rules for maintaining the energy of the circulation and nutrition of every single part of the body and preventing diseases, we exercise also some beneficial influence on the special senses; but still they are apt to become old and blunted. Massage of the eyes, the ears and the nose, can do a certain amount of good, most so that of the eyes; and by using them judiciously and avoiding overstraining them, we can prolong the energy of their functions and thus prevent or at all events postpone one of the greatest inconveniences naturally connected with old age.

Amongst the important matters into which I am unable properly to enter are the *clothing*, which ought to cover the body without being too tight, and ought to be varied according to the varied meteorological conditions; and the even more important subject of the *house* or the rooms we live in, which ought to be light, airy, and well ventilated, and ought to have a sunny aspect. With regard to the former we may refer for valuable advice to an article "On the Influence of Dress on Health" [71], by Sir Frederick Treves, and on the latter to a paper by Mr. Shirley Murphy, "Health at Home" [48], both in the "Book of Health." Of great influence on the condition of the body is *climate*. This vast subject, too, we cannot discuss. We must mention, however, that a regular *change* for six to eight weeks every year from one part of the country to another, or to the seaside, or to the Continent, to different elevations above the sea, is a great help to mind and body, and through



this, a powerful agent in the prolongation of life. The exact choice depends on the condition of the individual. On some persons a stay at the seaside, or yachting, or a longer sea voyage, exercises the best influence ; on others a stay in mountainous districts at various elevations, combined with climbing ; for others again, travel from one place of interest to another is preferable to a long stay at the same place. Travelling is in fact a great promoter of longevity. I am inclined to ascribe the benefit of travelling partly to the circumstance that the traveller is forced to change more or less his habits while travelling ; partly to the influence on the mind.

Old people whose mental activity begins to be stagnant ought to go to localities where their attention is stimulated by art, by history, by scenery, by the manners of the people, such as Egypt, Rome, Naples, Palermo, Florence, Venice, Athens, Constantinople, Vienna, Munich, Berlin, Paris, &c.

With increasing years the resisting power of the organism decreases, in some more and in others less, in some earlier, in others later. While in youth and in the prime of life the cold, the dampness, the high winds, the fogs and mists are fairly well borne, they cause in many old people, especially those who neglect regular open-air exercise, and also in persons weakened through acute disease (such as influenza, rheumatic fever, pneumonia, &c.), catarrh, rheumatism, inflammation of the lungs, mental depression and other ailments, and through these lead to disease, premature senile decay and death. Warmer clothing is useful, but it is often insufficient to counteract



the inclemencies; it is therefore prudent for many of those who have lost much of their resisting power, to spend the winter and early spring in milder climates, where their accommodating powers are less tried, such as the south and south-west of England and Ireland, the Riviera (especially the more quiet and more elevated localities of Grasse, Costebelle, Cimiez), Pau, Biarritz, Arcachon, Malaga, Corsica, Sicily, Algiers, Madeira, Teneriffe, or Egypt. In addition, the large amount of sun in some of these localities, the longer duration of daylight, and the flowers, cheer the mind and render it more hopeful, and hope and cheerfulness exercise, we repeat, a most beneficial influence on the whole body. The first Lord Brougham showed his wisdom in this matter by spending the winters of his later life at Cannes, where he enjoyed much better health and prolonged his life considerably.

There are some other subjects which deserve discussion; but I have already transgressed the limits of time, and I trust that if the suggestions I have ventured to make are acted upon, the life of the individual will be prolonged, and that in the course of generations a habit of living judiciously will be created and transmitted by heredity, and that the duration of human life will gradually be raised in a much larger number of cases to its normal term, viz., about 100 years; and I further hope that not only the duration of life will be extended, but that also its usefulness and happiness will be increased and terminated by old age without suffering. I will close this discourse by summing up in brief some of the most important points more fully discussed before:—



(1) To exercise and maintain in vigour all the organs and tissues of the body by regular daily walks or rides, supplemented by breathing and gymnastic exercises, and periodic walking and climbing tours.

(2) To practise moderation in eating, drinking, and all bodily enjoyment.

(3) To endeavour to obtain abundance of pure air in the house, and to spend as many hours as possible in the open air.

(4) To maintain and increase the resisting powers of the body, and counteract the inherited tendencies to various diseases.

(5) To create as far as possible the habit of going early to bed, and of rising early, and to restrict the hours of sleep, in adult life, to 6, or 7, or exceptionally 8.

(6) To promote a healthy condition of the skin by daily baths or ablutions.

(7) To keep the mental faculties in regular occupation by appropriate work.

(8) To cultivate sympathy, equanimity, contentedness, cheerfulness and hopefulness, and the great power of the will towards pursuing the path of duty and controlling anger, vanity, envy, jealousy, and all other passions.

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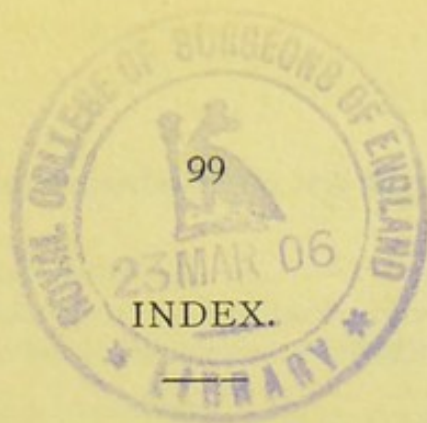


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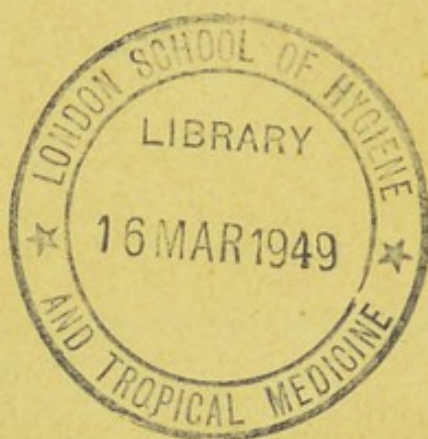
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