Brain-work and overwork / edited by George Black.

The "LONG LIFE" Series

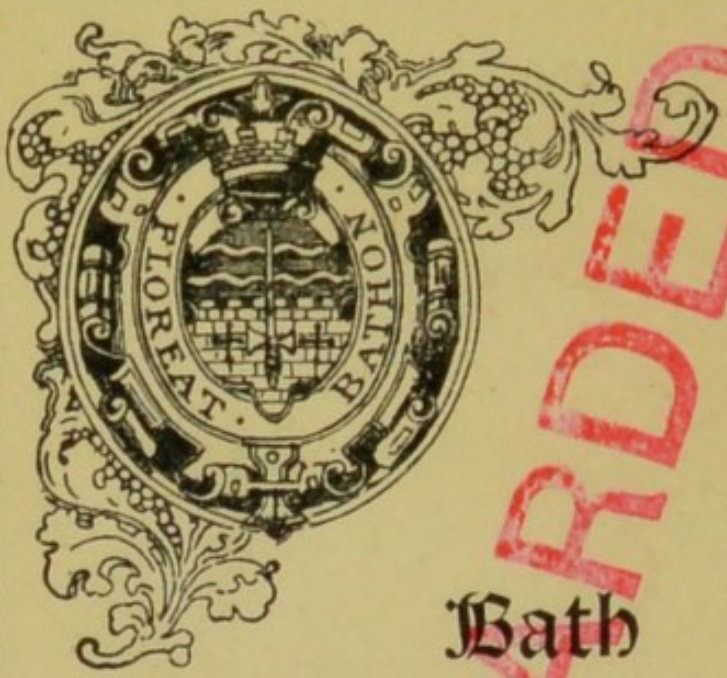
BRAIN WORK AND OVERWORK

BY

GEORGE BLACK

M·B·Edin:

ICE ONE SHILLING



A. E. Norburn

BRAIN-WORK AND OVERWORK.

BRAIN-WORK

AND

OVERWORK.

EDITED BY

GEORGE BLACK, M.B., EDIN.,

Author of "The Young Wife's Advice Book," "Sick-Nursing," &c.

WARD, LOCK AND CO.

LONDON: WARWICK HOUSE, SALISBURY SQUARE, E.C.

NEW YORK: BOND STREET.

PREFACE.

IT is difficult for the physician to lay down rules for the brain-worker, in regard to the methods he should adopt in his labour, to preserve the delicate instrument that is the source of his livelihood from giving way under the strain that is imposed upon it. Individual peculiarities have much to do with the habits that are acquired, and due allowance must be made for these in determining what is best. There are, however, certain fundamental rules which no one can afford to disregard, as the penalty is serious in the extreme; but, these borne in mind, the working-out of details may be left to the intelligence of the reader, who, if he be wise, will have learned something of his own constitution. One of these rules is, that no brain-worker can deprive himself, for any length of time, of an ample amount of sleep without suffering injury. Heed being paid to this, it may safely rest with the individual himself as to the time—morning or evening—in which he may choose to work. It must be remembered that uncongenial work, or work done under pressure, takes much more out of a man than that which goes with his will. So long as Sir Walter Scott worked his six hours a-day, and had his after-

noon and evening free, his fertile brain continued to produce its marvellous creations without impairment of his mental power; but when stern necessity drove him to make a gigantic effort to retrieve his shattered fortune, his towering intellect staggered to its fall. Another fundamental rule is, that out-of-door exercise must not be neglected. The time for taking it—the kind of exercise and the amount—must be regulated according to the health and temperament of the individual. It may also be said that dependence ought never to be placed on alcohol, opium, tobacco, or other like substances. When those are trusted to for prolonging the period of study beyond the time when the wearied brain calls for rest, only harm can result. In regard to the education of children, it may also be pointed out that nothing is to be gained by a hasty development of their powers. Far better is it to allow them plenty of out-door exercise, in order that they may develop a sound constitution, or correct any imperfections they may have inherited, than cram them with book-knowledge in those early days. It is of great importance to the brain-worker to cultivate an even habit of mind; and to be able to look at things cheerfully is both better for himself and all who may be in any way connected with him, and these he only can do by learning what it is essential he must attend to in the matter of sleep, exercise, food, and the like, and by wisely giving heed thereto.

GEORGE BLACK.

CONTENTS.

CHAPTER V.

REST IN RECREATION.

CHAPTER VI.

REST IN SLEEP.

CHAPTER VII.

CONCLUSION.

BRAIN-WORK AND OVERWORK.

CHAPTER I.

INTRODUCTION.

THERE exists, both within and without the ranks of the Medical Profession, a wide-spread belief that the exigencies of modern life are producing an ever-growing amount of nervous diseases. At first sight it seems easy to decide whether this belief be or be not well founded. In reality, however, it is at present not possible to come to a positive conclusion as to how rapidly nervous diseases are increasing. Reliable statistics are wanting. The figures furnished by the Registrar-General are the best at command, but they are open to grave criticism. By way, however, of treating the matter as satisfactorily as possible, the following table, taken from Dr. Althaus's work upon "Diseases of the Nervous System," is appended. This table appears to prove that the importance of the *rôle* played by nervous disorders does not

TABLE

SHOWING THE COMPARATIVE MORTALITY FROM ZYMOTIC, TUBERCULAR, NERVOUS, AND RESPIRATORY ORGANS.

	Zymotic Diseases.	Per-centage.	Tubercul'r Diseases.	Per-centage.	Nervous Diseases.	Per-centage.	Respirat'y Diseases.	Per-centage.
1838–42	347,158	20·04	347,738	20·08	209,923	12·10	148,084	8·54
1843–46	Vacat.	.....	.....	.....	.....	.....	.....	.....
1847–51	498,532	24·63	313,651	15·50	239,881	11·84	233,045	11·50
1852–56	454,231	21·85	335,275	16·10	258,221	12·40	272,970	13·15
1857–61	471,865	21·80	331,181	15·29	271,997	12·54	316,407	14·59
1862–66	560,015	23·36	347,644	14·51	293,175	12·23	357,422	14·92
1867–71	562,487	22·72	350,719	14·16	308,900	12·48	379,694	15·33
Mean Percentage of Six Lustra. .		22·90		15·94		12·26		13·00

increase. Another very curious result, seemingly proven by the figures of the Registrar-General in the hands of Dr. Althaus, is that the deaths from affections of the class under consideration are proportionately more numerous in rural districts than in cities. Thus, in a period of twenty-five years, the percentage of deaths from nervous diseases was in London, 10·66; in the south-western counties of England, 11·20; in Wales, 15·38.

In view of these facts, it would appear that the popular belief in the increase of nervous affections rests only upon the superiority of modern diagnosis; or, in other words, that nervous diseases seem more frequent only because we recognize them more clearly than did our fathers. It is probable, however, that to most minds these figures will appear to prove too much. I think most professional men will agree in believing that there is some fallacy underneath them, and will refuse to surrender their belief that the increasing wear and tear of modern life is showing itself in a corresponding increase of nervous troubles. Of course, in the limits of the Health Primer, it is not possible to discuss this question at length; but it may help, in preparing the ground for what is to follow, to point out some of the more obvious, although often forgotten, fallacies.

In the first place, it is very clear that the figures of the Registrar-General fail to cover the whole case.

Death is but one act in the Drama of Life. It is notorious that very many of the most troublesome nervous disorders produce not death, but life-long misery, the victim perishing at last of some disease not known as nervous. The record books of the government office take no count of such cases. Thus thirty years of confinement from spinal irritation may end in a consumption, and as such appear in the record. The history of epilepsy is but too often that of a slow but irresistibly progressive failure of mental power, until it may be the boy or girl disappears in the gloom of the idiot asylum, finally to die of a pneumonia or of a fever. Insanity rages or mopes in the wards of the hospital, in after years to be noted by the Registrar as a fatal dysentery. Often again, and these are the saddest of cases, the mental warp is not sufficient for the asylum, but is enough to render miserable the life of the individual, and to blast the happiness of the home circle. Death is the common lot; than which the living death, the perpetual torment of a nervous disorder, is far worse. How often is suicide the index of a nervous breakdown; yet who registers suicide as a nervous disease?

A very large number of the most fatal of nervous diseases occur especially in early childhood. These are, in many instances, the direct products of privations or of gross violations of the laws of health. As the science of hygiene is being more and more

widely studied, and more effort put forth to obey some of the most obvious hygienic laws, the nervous diseases of early childhood are becoming less frequent. As a notable instance may be cited the cretenism of Switzerland; formerly, in certain districts, the pathetically disgusting children and adults met one at every turn. Now, under the improved conditions of life, a creten is everywhere a sufficient rarity to attract attention. The diminution of fatal infantile nervous diseases is probably sufficient to affect the figures of the Registrar. Again, it must be remembered that many of the registered nervous diseases are really not diseases of the nervous system, but of some other organ.

A man dies of convulsions due to excrementitious poison, retained in the system because the kidneys are diseased and unable to separate from the blood the noxious matters which are continually being formed in the body. Another man dies of an apoplexy, because the diseased kidneys have produced simultaneously both a disease of the arteries, whereby their coats have lost their toughness and elasticity, and become brittle, and also an increase in the size and power of the heart, which causes it to drive the blood with excessive force. Usually, the elastic artery dilates, *i. e.*, gives a little when the on-coming blood-wave abuts against it; now the elasticity of the artery being gone, no yielding is possible. In the place of toughness is

brittleness, and when the abnormally powerful blood stream strikes the diseased artery wall, no wonder the latter often gives way and the current breaks through into the brain tissue. The vital fluid, out of its bounds, is a foreign body to the brain; it tears, lacerates, destroys, and a death from apoplexy results.

In both these cases — in the convulsion, in the apoplexy — a death from nervous disease may be registered. Work, worry, the special exigencies of modern life may have had nothing to do with the fatal result. The disease, in fact, has not been of the nervous system, but of the kidneys, the heart, and the arteries.

Modern science is revealing more and more clearly, on the one hand, that many of the so-called nervous diseases are really affections of other organs; and, on the other hand, that many affections of other organs are in part or solely dependent upon disordered nervous action. Cut a muscle off from its connection with the nerve centres, in forty-eight hours the galvanic battery will show that its structure is altering. I have seen the buttocks slough from a man in a few days, as the result of an affection of the spinal cord. How far pneumonia, and other acute and chronic disorders, have their origin in nervous exhaustion, we do not yet know; but the more we do know the more close does the connection seem.

A very notable illustration of such a breakdown

came lately under the attention of the present writer in the case of a very hard-working surgeon. The winter had been spent in the severest labor, under aggravated excitement and amidst great anxiety. It ended in disappointment. Immediately erysipelas and pneumonia appeared, and rapidly proved fatal. Not a death from nervous disorder, but a death undoubtedly in great measure, if not entirely, due to a giving out of the nervous system: a death from nervous strain, from the rush and worry of life.

One very suggestive point, already noted, in the figures of the Registrar-General is the greater proportion of the deaths from the so-called nervous diseases in the rural districts than in the cities. The habitual disregard of hygienic laws in the town is mostly of such a character as to breed fevers, consumptions, and similar affections. In the country, as will be apparent to all who think on the subject, the lack of over-crowding, the abundance of fresh air, the outdoor life, all have a disposition to diminish fevers, consumptions, and allied ills; whilst, on the other hand, the long hours of hard physical labor, the exposure to all sorts of weather, the continuous hardships, have a tendency to cause slow rheumatisms, degenerations of the organs of the circulation and of the kidneys, and finally death from diseases which seem to be, though they are not in their essence, affections of the great nervous centre —

the brain. It is really the blood-vessels or the kidneys which are at fault.

The facts enumerated lead us to accept with great reserve any deduction from the figures of the Registrar-General as to the lessening in modern times of nervous diseases. The figures do not belittle the importance of work and worry, they increase that of other causes. For our present purposes, it is comparatively unimportant whether nervous diseases are or are not on the increase. They certainly are sufficiently numerous and serious to warrant the most careful consideration.

The exact degree, and even the exact character, of the influences of modern life upon the human nervous system for evil may not be fully known; but certainly we do know enough to warrant the statement of the following summary or proposition: Modern life has a twofold action in regard to nervous affections; it protects from many degenerations which are the results of physical hardships and exposure, but it tends to produce nervous exhaustion, which may end in brain-softening or some other marked nervous disease, or may find its outcome in a pneumonia or a fever.

It is evident that a Primer like the present should give clear ideas how to meet and avoid not only those causes of nervous disease which are peculiar to our civilization, but also those which have long been

operative, and which are more gross in their character. To these shall be devoted the second chapter of this book, whilst subsequently work and worry will claim attention, and the final lesson be wrought out of rest — the consoler of every tired and weary worker. As, however, rest is a most important subject, and one of which the fullest discussion is necessary, several chapters shall be given to its study.

CHAPTER II.

GENERAL CAUSES OF NERVOUS TROUBLE.

IN the present chapter it is proposed to consider those causes of nervous disease which are in no way especially incident to modern life. So far from becoming more influential, many of these causes are growing less and less potent, under that gradual betterment of life conditions which is steadily taking place throughout the civilized globe. It is very plain that all bad hygienic conditions and surroundings tend to cause brain deterioration — bad food, bad water, habitual filth, living in badly ventilated, damp, or dark houses — these and many similar circumstances are sufficiently potent. A brain that only gets just enough nourishment to keep it alive will not produce much, and will not develop its powers; a brain that never has its proper bath of oxygen feels the want of its kindly stimulus, and moves most sluggishly in growth, as well as in thought-producing.

This aspect of the subject in hand is, however, so closely related to general bodily hygiene, that it shall

not be discussed here in detail. But it does seem right to repeat the oft-told but oft-forgotten platitude, that all these ill conditions act with twofold power upon the developing nervous system of the child: that precisely as a force which does not sensibly affect the mature tree twists the sapling, so do bad hygienic conditions in early life affect injuriously the plastic mass of the child's brain. Many a child's brain is as truly prevented from developing, or as distinctly forced into unnatural distortion by bad hygienic surroundings, as is the Chinese lady's foot by its bands and wrappings. The harvest depends not only on the natural soil, but also largely upon the conditions of the early sowing.

With these preliminary remarks, I shall pass at once to the consideration of those great causes of nervous affection to whose discussion this chapter has been assigned. These may be well studied under two headings, *Exposure* and *Dissipation.*

Allusion has already been made to the effects of physical exposure and hardship in the production of nerve troubles, but the subject will bear a little more elaboration. In the higher walks of life, as well as in the lower, not rarely acute nervous disorders come from sudden exposures. Not long since I saw a gentleman who stretched himself upon the cold, damp ground when heated, and the same evening suffered from paralysis, produced by congestion of his spinal

cord. Every practitioner of medicine must have seen instances of paralysis of the face due to sudden exposure of the heated countenance to a draught of cold air, or of thinly-slippered feet to the cold earth. Such cases of acute nervous disease due to sudden exposure are, however, very rare, when compared with those in which the nervous trouble has been secondarily caused by diseases of the circulation or of the kidneys, which have been the immediate results of the exposure. Pneumonias, rheumatisms, etc., following a "cold," are patent to every one; but the damage wrought by the exposure is often far less apparent, though none the less real and destructive. It is to these insidious results that attention most needs to be directed, because they are most often overlooked.

Not long since, in the course of my professional engagements, I fell in with a patient who was believed to be suffering from chronic brain disease, on account of an intense headache which dated back to a few days' service in the militia, during some trifling disturbances in one of our colonies. This headache was soon discovered to be due to Bright's disease of the kidneys, which, in turn, was undoubtedly the result of exposure during the time referred to. The case is here mentioned because it illustrates very well the danger which attends all sudden and unaccustomed exposure.

Habitual physical hardships are certainly more fre-

quently productive of nervous affections in the lower than in the higher ranks of life; but it is by no means certain that this is true of what may be called acute physical hardships and acute nervous trouble. Habituated from childhood to extremes of temperature, to damps, and excessive exertion, the Alpine guide or the sailor is a very different being from the man he guides over the mountains or across the water. Some years since, a very promising young physician whom I knew died of Bright's disease, for which no other cause could even be imagined but that, in some of his numerous pedestrian excursions the disease process had been commenced. The person who is habitually protected runs a risk from even an hour's severe exposure.

It cannot be too strongly impressed that exposure is a relative term. "One morning," says an American physician, "as the mists rolled away, I crawled out from under a pile of blankets, and, almost benumbed with the cold, shiveringly gathered together the embers of the dying camp-fire. A guide some yards off rose from the damp ground, where he had spent the night entirely unprotected, except by the cotton shirt and pantaloons which hid his nakedness, and looking at his coat hanging up in the tree overhead, said, 'I'll be goll darned if it war n't cold enough last night to put one's coat on.'"

Whenever a person accustomed to the luxuries of

city life tries "roughing-it," there is always danger from exposure and hardships. "Roughing-it," properly set about, has in it the promise of renewed life and vigor—yea, even of renewed youth; but it has also the seeds of death for those who, through ignorance, carelessness, or recklessness, neglect the dictates of that sound reason commonly called common sense. In "roughing it," whether we tramp as pedestrians through our native land or paddle our canoe over foreign waters, everything should be done in moderation. In all undue exposure there is a possible cause of nerve trouble which ought to be carefully guarded against.

In my own experience, exposure plays a very secondary *rôle* in the production of apoplexies, brain-softenings, and the like, when compared with dissipation. I verily believe that both in the higher and lower ranks of life, whilst work and worry count their victims by hundreds, dissipation counts its dead or dying by thousands.

Many of my readers may be tempted to skip the rest of this chapter, which is to be devoted to this subject. Very well. Only this shall be said, Let him who will, in his virtuous indignation or complacency, pass these paragraphs by, devote a spare minute to turning up the dictionary. In it we read, Dissipation, "the act of scattering." The connection with the word of the idea of vice seems to be modern — a natural outgrowth of the terrible scattering

of power which vice produces. My reader may not be vicious, but how many of us can look over our lives and say there has been no dissipation? Every injudicious effort, every unwise putting forth of power, every indulgence in softening luxury, is a dissipation. It is not, however, of such forms of dissipation that it is intended here to speak. The word is employed to introduce discussion of the excessive indulgence in pleasures, which may be classified as gastronomic, sexual, alcoholic — the groups being enumerated in the reverse order of their fatality.

Alcohol, and its effects upon the system, would form an appropriate topic for one entire Health Primer; at such length can it not, however, here be considered.

If there be one subject about which it is more necessary than another to write guardedly, and to beg for an unbiassed hearing, it is alcohol. It has been said that, in some countries, not a single judge has been known, in a political case, to decide against his party. Precisely parallel is the case of alcohol. Partisanship, pro or con, very often swallows up so completely the reason of the author or speaker, as to make his asserted facts as exposed as are his beliefs to the witticism of old Dr. Rush, who said: "The French lie, and Dr. —— relies on them." The temperance lecturer may err by the strong statements he makes just as the lover of whiskey may do.

The results of a very thorough examination of the action of alcohol upon the system may be summed up in a few words. In small amounts it is an arterial and cerebral stimulant, increasing the activity of the circulation and causing the person to experience a feeling of comfort and exhilaration; in large quantities it paralyses both brain and heart. When its physiological action was less understood than it is now, it was looked upon by many as a food—that is, it was regarded as capable of lessening tissue-change, and so curtailing the waste of the body, and some now are inclined to believe in it as such; but careful experiments have shown that it does not go to build up and repair waste tissues, and so, in the ordinary sense of the term, can not be regarded as a food. Neither is it the heat-giver that some suppose it to be. The feeling of glow which overspreads the body when alcohol is taken is the result of dilatation of those minute blood-vessels of the surface which we call capillaries, but the rise of temperature is very transitory, and all the while that this sensation of warmth is experienced a process of cooling is going on which is soon appreciable by the thermometer, and which becomes more pronounced the larger the amount of alcohol taken. Alcohol, if used at all, ought always to be taken with food, and then only in small quantities at a time. When taken without food, and in a concentrated form, it is highly dangerous, for the greater portion is absorbed by the veins of the

stomach and carried directly to the liver, which is apt to become chronically inflamed by the irritating action it exerts upon it. Carried through the blood-vessels, the poison is constantly in contact with their walls, and hence, in habitual hard drinkers, chronic inflammation of the coats of the vessels, with aneurisms and apoplexies in their train, are frequent. If drunk in excess, alcohol escapes from the body through the kidneys, and it may so irritate those organs by its continual presence in their most secret structure that Bright's disease, or chronic inflammation of the kidneys shall be the result. For the brain, alcohol has an especial fondness. In the hollow places in the cerebrum, known as ventricles, it has often been found in very notable amount. The deaths, directly and indirectly, produced by alcohol are so innumerable, that to speak of them is to tell a wearily-known tale. A few figures, however, may be cited to show the enormous percentage of nervous affections produced by this agent. In 1844 it was stated, in a parliamentary report, that, in the ninety-eight visited asylums of this country, containing in the aggregate 12,007 insane persons, 1,799, or fifteen per cent. of the cases, were due to excessive indulgence in alcohol, and four per cent. to dissipation, of which drunkenness formed one feature. Dr. Hutchinson reported, in the Glasgow Asylum (1840 to 1846), one out of four cases as alcoholic. More recently (1872) it has been officially

stated that, in the Wakefield Asylum, sixteen per cent. of the men and seven per cent. of the women suffer from the abuse of spirituous liquors. The collated reports of the insane pauper establishments of England seem to show that, in eleven per cent. of all their inmates, mental ruin is referable to alcohol, and that those who may be termed "alcoholic insane paupers" yearly cost the State between £80,000 and £100,000 for maintenance. Figures can be multiplied all pointing in the same direction, but only a few more shall be quoted, gleaned from the disease and death records of Northern Europe. Hess found, in a Swedish asylum, that half the insane men had been drunkards. Evidence more frightful even than this of the ravages wrought by alcohol is furnished by the effects of the removal of the heavy tax on alcoholic drinks in Norway. In eleven years (1825-36) the percentage of increase for the whole population was: mania, forty-one per cent.; melancholy, sixty-nine per cent.; and dementia, twenty-five per cent. Worse even than this was the effect upon the rising generation, for idiocy increased one hundred and fifty per cent. That this increase was due to the augmented consumption of alcohol was shown by the inquiry made by Dahl, who found that out of one hundred and fifteen idiots, sixty per cent. were the children of drunken fathers and mothers. Drunkenness in the present may be the cause not only of idiocy in the offspring, but of various

other outputs of nervous degeneration and nervous weaknesses. From what has been said it is plain that the habitual use of large quantities of alcohol is a deadly sin against the brain and its dependencies. The results of an occasional debauch are far less serious to the man or woman than are those of habitual slight intoxication or "befuddling." Even when the daily tipple never reaches the point of slight intoxication it is fraught with evil. Especially is this so if a strong liquor be used in an undiluted form and upon an empty stomach. A dram taken in the middle of the morning, amounting to two or three ounces of whisky, is far from serviceable. The man who requires a couple of ounces of whisky or brandy before breakfast, upon rising, has travelled some distance on the road towards alcoholic ruin. The effect of an occasional excess may be worse for the offspring than for the parent. A child begotten during a debauch would be very apt to be idiotic or epileptic, although the father had been sober for many years previously. Although it may not be clearly made out that in small quantities, and taken along with food, alcohol is productive of disease, it should be remembered that the amount which can be taken with impunity is much less than most non-abstainers are willing to admit. From half an ounce to an ounce of alcohol may be regarded as a moderate daily allowance, and this is equivalent to from half a pint to a pint of beer; but it must be distinctly borne

in mind that in whatever form—beer, wine, or spirit—alcohol is taken, it cannot be regarded as anything more than a luxury; by no amount of reasoning can it be looked upon as a necessity by those in health. Bodily and mental work can be quite as well—perhaps, on the whole, better—done without than with it. Ample testimony in regard to the former is furnished by officers who say that soldiers on the march can endure greater fatigue when completely deprived of alcohol, and this applies both to hot and cold climates. This question has been carefully gone into by Parkes in his "Practical Hygiene," and I shall quote in this connection a few of the cases cited by him. "In the American War of Independence, in 1783, Lord Cornwallis made a march of over 2,000 miles in Virginia, under the most trying circumstances of exposure to cold and wet, yet the men were remarkably healthy." "In 1800 an English army, proceeding from India to Egypt to join Sir Ralph Abercromby, marched across the desert from Kossier, on the Red Sea, and descended the Nile for 400 miles. Sir James McGregor says the fatigue on the march has, perhaps, never been exceeded by any army, and goes on to remark: 'We received still further confirmation of the very great influence which intemperance has as a cause of disease. We had demonstration how very little spirits are required in a hot country to enable a soldier to bear fatigue, and how necessary a regular diet is. At

Ghenné, and on the voyage down the Nile (on account of the difficulties of at first conveying it across the desert) the men had no spirits delivered out to them, and I am convinced that from this not only did they not suffer, but that it even contributed to the uncommon degree of health which they at this time enjoyed. From two boats the soldiers one day strayed into a village, where the Arabs gave them as much of the spirit which they distil from the date-tree as induced a kind of furious delirium. It was remarked that for three months after a considerable number of these men were in the hospitals.'" "Sir John Hall, K.C.B., says: 'My opinion is that neither spirit, wine, nor malt liquor is necessary for health. The healthiest army I ever served with had not a single drop of any of them: and although it was exposed to all the hardships of Caffir warfare at the Cape of Good Hope, in wet and inclement weather, without tents or shelter of any kind, the sick-list seldom exceeded one per cent.'" Parkes, after carefully weighing the evidence for and against the use of alcohol in soldiers' life, says: "To me there seems but one answer. If spirits neither give strength to the body, nor sustain it against disease—are not protective against cold and wet, and aggravate rather than mitigate the effects of heat; if their use, even in moderation, increase crime, injure discipline, and impair hope and cheerfulness; if the severest trials of war have been not merely

borne, but most easily borne, without them; if there is no evidence that they are protective against malaria or other diseases—then I conceive the medical officer will not be justified in sanctioning their issue under any circumstances." In like manner, when we inquire into the action of alcohol upon the higher part of man's nature, in order to determine in what way the work of the mind is influenced by this powerful agent, we are driven to a similar conclusion, and shall not be justified in advocating its habitual use in anyone engaged in mental occupation. It has been already pointed out that for the brain alcohol has an especial fondness, and if its effects upon this organ be to impair hope and cheerfulness, to destroy the power of close and consecutive reasoning, to render the grasp of a subject less complete, to affect the judgment by presenting things in an unnatural light, to leave a man depressed, melancholic, and weary, then must there indeed be danger to the brain-worker who trusts to alcohol to enable him to accomplish his task. The use of wine is more apt to be injurious to the clerk than to the peasant; to the dweller in the city than to the roamer on the mountains. The Old English squire was able to get drunk every night through a long life, because every morning he galloped madly twenty or thirty miles across the country after the hounds. The violent exercises renewed his tissues, used up the surplus food, flushed the glands—which

are the sewers of the system—and washed out through sweating skin the excess of alcohol and the impurities produced by it, and thereby finally prevented his sensuality from having a worse effect than having an occasional attack of the gout. The yearly waste of money in alcohol in this country is frightful; but there is another cause of great waste in the excessive amount of food, more particularly of butchers' meat, which is eaten. Many of the hungry poor in the haunts of misery and wretchedness of our large towns might be fed, and fed abundantly, by that which is eaten over and above the requirements of the wealthy. It has been said by one writer that almost everyone eats more food than is required. This is, doubtless, going too far, but it may be confidently affirmed that very many do eat more than they require to keep their bodies in health; indeed, the system is so constructed as to provide for a habitual over-supply of food. The meat that is not needed is soon broken up in the blood into substances which are incapable of forming tissue. These substances are really poisonous, and, if allowed to remain, produce grave injury; but in the skin, in the intestines, in the kidneys, they meet with thousands of glands whose duty it is to remove them from the blood. These glands are the so-called *emunctories*. The power of these excreting glands is limited; they are only capable of so much labour. When a great excess of food is habitually taken, they

are habitually overworked. The blood, under these circumstances, becomes loaded with improper materials: and it may be that the gouty habit is created, which in turn is prone, sooner or later, to produce degeneration of the walls of the blood-vessels, resulting in apoplexies. Habitual over-eating, or habitual drinking, plays havoc with vitality. As already stated, many well-to-do persons eat more than is necessary for the requirements of the system, but, as pointed out, Nature has provided for the removal of this excess. It should not be forgotten, however, that overwork brings enfeeblement to the eliminating glands, and an excess of noxious matters in the blood is a constant irritation to the emunctories. Enfeebled and irritated, no wonder that these long-tried but faithful servants often finally become fatally diseased. The food principles are chiefly taken out of the body by the kidneys, hence it is an overplus of food containing much of the nitrogenous principles—*i.e.*, meats—which is especially liable to overwork and irritate the kidneys. Very few, if any, of those who read this book will ever suffer from an insufficient amount of food, but among the so-called working-classes cases of nervous exhaustion, hysteria, &c., are met with in which the lack of proper nourishment has greatly aided in the production of the disease. There are multitudes of seamstresses who chiefly subsist on bread and tea. Under these circumstances, the impoverished blood

fails to nourish the nerve-centres, and headache, hysterical symptoms, and other manifestations of lowered nerve-tone soon show themselves. The substitution of cocoa or milk for tea would be a decided gain in the dietary of such persons. As either extreme in food-taking is capable of doing injury, what should be the food of the brain-worker, and is there any especial diet to which he should adhere? The answer to the second part of this double question is: there is no food especially adapted to nourish the organ of thought—no peculiar diet for the brain-worker. He or she may eat such food as other rational beings eat, avoiding excess, but always eating sufficient—bearing in mind that while Nature provides for getting rid of an excess of food from the system, she has no means of making up a deficiency. It should be remembered, however, that where the life is chiefly sedentary less animal food, particularly less of the more stimulating sorts, as beef and mutton, will be required. Fish should have a prominent place in the dietary of the brain-worker, and poultry, rabbits, eggs, fruit and vegetables, may all be eaten with advantage. A small basin of oatmeal porridge, well-boiled with new milk or a little cream, is an excellent article of diet. Beef or mutton should not be eaten more than once a day. Closely connected with this food subject is that of the use of certain narcotic stimulants—tobacco, coffee, tea, and their congeners. It may be thought absurd

to consider these substances under the head of dissipation—certainly the amount of injury wrought by them falls a long way short of that produced by alcohol—nevertheless, they are potent for evil, and their influence is very perceptible in the nervous disorders of modern life. In a class by itself stands tobacco—a substance which acts upon the human organism as a most deadly poison, but which comes in time to be tolerated by the system and appears to be the daily solace of millions of human beings. In persons unaccustomed to its use, even small quantities of it produce a horrible nausea and vomiting, attended with giddiness and a feeling of intense wretchedness and weakness. When larger quantities are taken, the results are still more pronounced: burning pain in the stomach, purging, giddiness, passing into a low delirium, a rapid, feeble, and finally imperceptible pulse; cramps in the limbs, absolute loss of muscular strength, and, at last, complete collapse, deepening into death. When tobacco is used by the brain-worker its employment should be restricted to the hours of rest and calm—it should be used to soothe the nervous system, and help it to settle into the state of quiet in which it recuperates its powers. The more sedentary, and the freer from emotional or other excitement, is the life of the brain-worker, the less excuse is there for the use of the narcotic. Moderation in the use of tobacco is to be impressed upon the brain-worker, who

seems often to think that he can smoke at all times of the day and night without any injury being done him.

It should be remembered that the injurious effects of smoking are more pronounced where indulgence takes place in a small, badly-ventilated room, where numbers of persons are congregated together, and a much less quantity of tobacco is required to prove hurtful than when taken out of doors. An important matter for the brain-worker to bear in mind is that tobacco-smoking has the effect, when used in excess, of causing dimness of vision which, of course, can only be remedied by giving up the habit for a time or altogether. The blood, too, is affected, and the little red cells that perform the important function of carrying oxygen to the tissues are reduced in number, and the person has a pale, anæmic look. From the time of King James the First of England till now, anti-tobacconists have existed in our midst, and strong language has been employed to describe the evil effects of smoking upon the system. That harm does result is abundantly proved when use passes into abuse, but the evils arising from excessive indulgence in tobacco are not for one moment to be compared with those arising from the abuse of alcohol. Nevertheless that such exist should put each smoker on his guard and prevent him, should reason arise for it, continuing a habit which may impair his usefulness.

I am sure that very frequently nervous breakdown is hurried in its development by the constant employment of the drug.

The manifestations of the excessive use of tobacco are not always uniform, but in the great majority of cases they consist of evidences of excessive nervous irritability, especially affecting the heart. Minor ills, such as chronic sore throat, dyspepsia, etc., are not rare, but the serious symptoms which demand attention are usually connected with the heart. Cardiac distress and palpitations, irregular, intermittent pulse — these, in minor and major degrees, are nearly always present when tobacco has played an important part in the production of a nervous breakdown. It should never be forgotten, that the sedentary brain-worker bears tobacco much worse than does he who leads an active outdoor life; and also that the same individual, during his periods of active outdoor exertion, resists the deleterious effects of tobacco much more strongly than he does when a desk-student. More than this, not only do habits of life, but also individual and race peculiarities, affect the tolerance of tobacco. Idiosyncrasies, *i. e.*, individual peculiarities, must be studied in the individual; but peculiarities of classes or races of people, *i. e.*, temperaments, may be studied as general principles. It may, therefore, be laid down as a law, that nervous temperaments badly withstand the deleteri-

ous effects of large amounts of tobacco. The phlegmatic Teutonic student lives in an atmosphere of tobacco-smoke which would be irresistible to his more nervous Oxford or Cambridge *confrère*.

It is evident that, as with alcohol, so with tobacco, no fixed rule can be properly enunciated as to the daily amount to be used. I have seen a large number of cases in which tobacco had evidently been very potent for evil; and my experience seems to warrant me in stating that very frequently, if not usually, in the nervous Englishman, who works hard with his brain and takes but little exercise, more than two mild cigars a day is injurious; and that it is best to take the "smoke" after dinner, during the hours of rest.

Thein, the active principle of tea, and other identical or closely allied alkaloids, are found in various plants, widely separated in their geographical distribution, as well as in their botanical relations. Whenever such a principle exists in a plant, that plant is used by the inhabitants of the country as a drink. The North American Indian had his "Yaupon," or black drink, made out of a species of ilex or holly. Ilex Paraguayensis, Paraguay holly, or Paraguay Tea, furnishes the beverage of a continent; the coffee-bean, the coca-leaf, the chocolate-nut, the true tea-leaf, burden the commerce of the world. Though, like tobacco, these various principles apparently

lessen the waste of tissue, I conceive the great reason of their universal use is psychical — men take them because their effects are pleasant.

Although these substances are similar in their action, they are by no means identical. Of coca and Paraguay tea I have had no experience, and few, if any, of my readers will ever use them. I shall, therefore, say no more about them.

Of the drinks habitually employed in this country chocolate stands by itself in that it contains comparatively little of active principle. It is used almost solely on account of its pleasant taste, and I have never seen any ill effects from its use, saving only sometimes a little gastric disturbance, produced, apparently, by the fatty matter it contains. Those with whom chocolate disagrees soon find it out, and it is not necessary to say more about the subject.

Tea and coffee in their crude state contain the same active substance. Experience teaches, however, that their action upon the system is by no means identical. The reason of this is not far to seek. In the cup of tea the *thein* exists unchanged. But the coffee-berry is roasted before it is used, and, whilst part of the alkaloid probably escapes change, there is formed in the roasted bean, and consequently to be found in the cup of coffee, a new substance — the so-called empyreumatic or tarry oil of coffee. This is far from being devoid of activity.

Dr. Lehman, a great physiological chemist, has found that it is even more powerful than caffeine itself, especially in producing sleeplessness.

Daily experience shows, also, that coffee is injurious to more persons than is tea, producing in very many headache. This is, probably, in some cases at least, due to its disagreeing with the stomach. It often seems to irritate the mucous membrane. It is notorious that in persons suffering from diarrhœa coffee is apt to act as a purgative.

In armies, coffee is mostly used as the beverage to lighten the fatigues of the campaign; but tea, it has been noticed by travellers, is greatly preferred in many places by persons accustomed to go through much exertion. It is probable, therefore, that the two beverages are similar in their general powers. The symptoms most frequently produced by them are headache and general nervousness — often, in coffee-drinkers, dyspepsia being added to these ills, and sometimes also palpitation or other disturbances of the heart.

Wherever apparently causeless headaches exist, the possibility of their being produced by the undue use of tea or coffee should always be thought of. Not long since I was called in consultation in a case in which a severe, habitual headache had resisted treatment for a year or more. Inquiry revealed that tea was very largely taken three times a day, and stopping

the habit cured the headache. The worst of these cases are seen in poor women, who substitute tea for meat, and live almost exclusively on bread and tea. Under these circumstances, thin or poor blood, with its train of nervousness, neuralgias, hysterias, etc., are sure to be produced, partly by the action of the tea, partly by the lack of proper food, partly by the strain of overwork and anxiety.

It should never be forgotten, that amongst the well-fed and comfortable there are persons who are unable to withstand the deleterious effects of even small quantities of tea and coffee, and that the amount taken by an individual is not an absolute measure of the mischief possible to be wrought. The general law is, that in the sedentary and in those of nervous temperament, the free use of the cup that cheers, but does not inebriate, is most prone to do harm.

In Germany, one may watch a yearling baby drinking beer with its parents in the Volksgarten, and in our farmhouses, or at the table of the laborer in this country, the toddling child may often be seen with its cup of tea or coffee. Elaborate argument is scarcely necessary to prove that this is altogether wrong; the sensitive nervous organization of the child is especially susceptible to the action of narcotics. Every physician knows that it is not safe to give a dose of opium to the child proportionate to that administered

to the adult. In the open-air life of the farm, the tea and coffee may not have so injurious an influence on the child; but in the city, where everything tends to increase the nervous temperament, so often inherited, the effect is decided. To allow even a boy or girl in their teens to study under the influence of one of these stimulants, is an abomination.

It would seem natural here to speak of the employment of tea and coffee by the adult as a means of assisting the brain to labor; but this will be better discussed in the next chapter.

It is now necessary to approach a subject whose importance forbids silence, but whose nature is such as almost to forbid utterance in a popular work like the present. Yet how is the lesson to be learned, if no one teaches it? It is scarcely necessary or right here to say much about the dangers of a sexually impure life. Only this should be remembered, that across the life of the man who yields once to temptation, lies the shadow of a possible fate to himself, and, if he marries, to those most dear to him, amongst the most horrible on earth; that no precaution, that no supposed character on the part of his partner in guilt, is any guarantee of escape from a disease which, once induced, is probably ineradicable from the system. Also, that apparent escape from evil consequences is by no means always a real escape.

A large proportion of severe brain affections are the

result of contracted disease; and it has been my fate to see many persons who were astounded when told the true nature of their disorder — they having never suspected that they had suffered, although they freely confessed to having, in their youth, exposed themselves to the contagion. They thought they had escaped, but the early sowing yielded in after years its harvest of suffering and death.

A paragraph seems here to be required, also, concerning the practice of secret vice by the young. This notice is not only necessitated by the natural importance of the subject, but also by the widespread advertisements of lying quacks both in and out of the secular, and even the religious, press. The effects of the practice are not nearly so bad as the statements in the advertisements indicate. Indeed, in my own experience, there have been at least two cases in which all the suffering was mental and imaginative, to one where there was a distinct physical basis of complaint. The extent of the quackery shows the richness of the harvest — if patients were not forthcoming, money to pay for the advertising would soon fail. By any moth who may be tempted to be singed at the candle of this class of quacks, the following considerations ought to be well weighed: The advertising doctor has no knowledge which is not possessed by the regular physician, whilst, in the majority of cases, he is an ignorant man. By advertising, he becomes a profes-

sional outlaw, and a man who is an outlaw among his fellows may be safely set down as unprincipled. He who has a reputation to lose will not risk it for a trifle, much less throw it away. Usually, an advertising doctor is unprincipled as well as ignorant, and will, by lying, by extortion, by keeping ill, etc., filch all that he can from his victim.

The only sensible course in this, as in other cases of real or imagined illness, is carefully to select a well-educated doctor, and, if any doubt be still felt, to request a consultation with a second physician.

Secret vice, although its results have been greatly exaggerated, is capable of producing, and does produce, much serious disease. Its practice is by no means confined to males, and is very often persisted in rather through ignorance than through want of virtue. There comes, therefore, in the life of the youth of both sexes, a time when it is the duty of the appropriate parent to explain fully and modestly the relations of the sexes. In regard to girls, Nature points out the appropriate age, and the explanation should immediately follow the first evidences of sexual development. In regard to boys, individual needs and circumstances differ, but about the twelfth or fourteenth year would seem proper. Always the parent should remember that innocence is not virtue, but ignorance; and that it is a very poor foundation

upon which to rest in the temptation that comes, especially in our large cities, to every one.

In a considerable proportion of the cases of nervous breakdown which have come under my notice, the disorder has had its origin in matrimonial excesses. Intemperance in this regard rests as often in ignorance as in lack of self-control. Whether indulged in through want of knowledge or want of virtue, excess always brings the penalty in the shape of weariness, lassitude, loss of power to do mental work, and gradual impairment of nerve-force, which may progress until the man or woman is reduced to a condition of hysterical exhaustion. Sometimes excess seems for a long time to bear no evil fruits, until suddenly a serious organic nervous affection is developed. The danger from this source is especially real to brain-workers, as the robust man, who leads a life of activity in the open air, is far more able to endure sexual excess. The important point as to where the line is to be drawn between proper and improper indulgence must be settled by each individual for himself, with or without the aid of his physician. To phlegmatic persons, whose occupation is active, and whose work is largely muscular, greater latitude is allowable; but for the nervous student, great caution is necessary.

CHAPTER III.

WORK.

BY the sweat of thy brow shalt thou earn thy bread, is the old curse pronounced for transgression. Labor of the lower kinds,— hard, muscular work,— unskilled putting forth of brute strength in mere toil, is a penalty, a sorrow, in spite of all that may be written about the dignity of labor. A skilled occupation is, however, far otherwise. Brain-work, if it be not too severe, brings its reward with it in a continual renewal of interest in life. Possibly the man most to be pitied is he who has no object in living— no work which gives zest to existence. Nevertheless, scarcely lower down in the ranks of misery is he who has too much to do ; whose toil is beyond his strength.

If the testimony of the people themselves is to be received, the number of overworked members of this community is something frightful in the aggregate ; but the catalogue of lazy men, who are forever talking about the multitude of their labors, is not a short one. Those who complain most of being excessively busy

and jaded are usually the farthest from exhaustion. The very busy man rarely finds time to think or speak about himself. Perhaps in this is the real peril — the danger of breakdown to the valuable life is enhanced by the forgetfulness of self.

In the eager pursuit of wealth, fame, or other object, the maxims of wisdom are apt to be forgotten, and the admonitions of the physician neglected; indeed, too often are the warnings of Nature herself overlooked, and the slight symptoms that presage the storm unnoticed. The really busy man is the one who most needs to read books of the character of the present. To save the life of the man who is always afraid of being overworked, it is hardly worth while to write a Health Primer.

The human organism is able to endure an enormous amount of continuous toil without detriment, provided the labor be performed with as little friction as possible. But not rarely achievement bears no proportion to effort; too often is it the waste, not the legitimate outflow of force, which drains the supply of energy.

The thorough-going materialist, who follows his belief to its extreme logical conclusion, teaches that passion and thought are the direct results of the action of the brain; that precisely as spittle is the secretion of the salivary and buccal glands, so are ideas the secretion of the brain. The writer and probably the great

majority of the readers of this Primer do not subscribe to this doctrine. But the most enthusiastic and orthodox of theologians, whilst asserting that there is something endowed with perpetual life behind the physical mass of the cerebrum, acknowledge that for correct thinking a healthy brain is necessary; and that the brain is an instrument — a machine, one of the results of whose working is the putting forth of thought. Every machine performs its work in obedience to certain laws, and every skilled mechanic ought to understand at least the general principles of construction of the machine he works with.

Before a fair discussion of the effect of work upon the brain can be carried on between author and reader, some slight account of the nature and structure of the organ must be premised, for the sake of those who are ignorant of this class of facts.

The conflict between the various grades of so-called scientific and orthodox thinkers has waged so noisily about the colorless, structureless material which is the basis of all known life,—and in which indeed all known life resides, — that every one to-day is familiar with the word *protoplasm*. Do not be startled, O reader. Neither in or out of the paths of orthodoxy are we to wander together in the study of the so-called higher problems of life. I merely want to direct attention to the fact, that the brain is only a mass of protoplasm,

in the highest degree peculiar, and, as the scientist says, specialized, *i. e.*, set apart for a peculiar function or office. Now all protoplasm dies continually in its own action. It is a sort of sphinx, intensely active, ever dying, but ever renewing itself until the time comes when, from some inscrutable law of its own being, or from the failure of its supply of food, it loses its power of recruiting itself, and in verity dies forever. All bodies are either simple or compound. Science has discovered that the ultimate particle of an elementary or simple body has a definite weight, and probably also form. To this ultimate indivisible particle the name of *atom* has been given. A compound body also has its ultimate particle, which cannot be divided without destroying the constitution of the compound body, or decomposing it, as the chemist says. This ultimate compound particle is made up of a definite number of atoms, and consequently has its fixed size, weight, and probably form: it has been graced with the title of *molecule*.

Protoplasm is a mass of molecules, and when one of these molecules has performed its life act, be that act the making of a drop of saliva or the deduction of the law of gravity, the molecule dies. The protoplasmic mass dies not, with its molecules, because other molecules have not exercised themselves, and are perfect. The protoplasmic mass does not waste, because the remaining molecules immediately set

to work to take away the dead matter, and to form a new living particle in the mould left by this removal. Although the work of the brain protoplasm is so peculiar, its method of work and requirements are precisely those of other protoplasm; it must have oxygen and the other foods which are carried through the body in the blood. This necessity requires that blood-vessels should everywhere run through the brain. Again, the extreme specialization of the protoplasm of the nerve-centre causes it to be extremely delicate, whilst many of its actions are so essential to life, that protection from injury, and even from any disturbance by external circumstances, is eminently demanded. This protection is obtained by so placing the brain in a bony case — the skull — that those portions of the brain which preside over the breathing and circulation, *i. e.*, the vital functions, are placed at the bottom, and are covered by the whole mass of the brain itself, as well as guarded on all sides by this skull.

The unyielding nature of the skull, and the softness of the brain tissue, expose the cerebrum to remarkable variations of pressure. If more blood goes into the brain than usual, there must be within the skull an unnatural pressure; whilst if less blood than normal goes to the organ, the pressure will fall. It is probable that the variations in the amount of liquid in the brain cavities compensate in a measure for these

changes of the pressure, but every surgeon has seen an abundance of cases of the so-called compression of the brain, when consciousness was lost because of the pressure upon the contents of the skull.

This very sketchy outline of the primary principles of construction and action which govern brain-work is probably sufficient for the necessities of our case.

It is plain how mental labor affects the brain. A thought is the index-hand that marks the death of a protoplasmic molecule, or rather of protoplasmic molecules, for the production of a thought is usually a complex process involving many molecules. Normally, this molecule or these molecules are removed and replaced by the processes of nutrition as fast as destroyed. If, however, thought follows thought with such instant rapidity that no time is allowed for the reproduction of protoplasmic molecules, by and by so many molecules or working units will have been used up as to produce a constantly growing scarcity of those normal particles which are capable of building up the new working units that shall replace those that have been wasted by the continuous mental efforts. Long before such a condition is reached, a profound sense of weariness usually gives an abundant warning that labor must be desisted from, and that the brain imperatively needs rest in which to rejuvenate itself. If during the day's labor not too much work has

been performed — if the process of destruction has not gone too far, the brain, during the night's sleep, is able to reconstruct all that was injured, and, when the light summons to active life, to start as fresh and perfect as it was the previous morning. If, however, the work has been a little too severe or the period of recuperation a little too short, the brain does not quite repay itself for its expenditures, and starts in the morning a little less capable of effort. The loss may be so slight as not to be perceptible, but it is these slight losses which ultimately tell. Let us suppose, for illustration, that instead of there being in the brain on the second day 30 million million of molecules, there were only 29 million 999 thousand 900 million of perfect working units. The account would be short; but so little short, that all would seem perfect, the deficiency not being perceptible. Let the process go on week after week, month after month, year after year — a constant growing poverty, no more irresistibly perceived than many a slowly growing pecuniary bankruptcy, — until at last not enough of molecules are left for labor, and nervous breakdown ensues, with perhaps scarcely enough of molecules remaining to rebuild at all the mental machine. It is not hard to understand, in this light, why so long time is required for the recovery of a case of nervous exhaustion. The brain merely tired may have the power of reforming a million of atoms in a night. The brain

which has been using its substance can perhaps build only fifty atoms in the specified time, and months are required to replace the wasted tissue. Worse than this, it would seem that the exhausted brain produces molecules not only small in quantity, but also poor in quality. It develops new molecules very slowly and also very imperfectly. Hence it happens so often that the brain, once thoroughly used up, never recovers its pristine powers.

It is a well-known fact, that the worst breakdowns are those which have been very slowly brought about. This may be because the brain becomes, as it were, able to produce work and to destroy atoms without the long-neglected sense of weariness being felt; a sort of benumbment creeping over the organ, which renders it insensible to its own needs, until it comes to its last working units without having perceived its oncoming poverty. It is like a spendthrift who will not look at the wasting of his principal, but calls everything he can get his hands on income until the whole is gone.

It is indisputable, that the way in which mental work is done influences greatly the destruction of cerebral protoplasms, *i. e.*, the wear of the brain. It is therefore a matter of the greatest importance to understand the best ways of working. In this, as in so many other things which we are studying, individual peculiarities are of importance. Of still

greater importance, however, are the wider principles of uniform application to all classes of persons. These shall be now considered; idiosyncrasies seeming to arrange themselves for consideration better with the topics of the next chapter.

In the first place, it is plain that, if from any cause, the brain fails to perceive the weariness which is its safeguard, it may continue to go on in some supreme effort of continuous work until its substance has been so wasted that there is not enough left for speedy recuperation. Usually, the most intense effort only demands a proportionately complete and prolonged rest. But there would seem to have been cases, or so at least it is asserted, in which the continuous putting forth of energy has been so severe and so protracted as actually to use up the brain, and not leave enough of power to carry on the vital action, and immediate death has ensued. Such results as these plainly can not occur under any humdrum circumstances. It needs the excitement of battle to prevent the warrior from feeling a severe wound, and to such excitement must that be comparable which benumbs the brain so completely to all sense of tire and causes it to destroy itself.

The man who is set to ditching very rarely injures his muscles or his nervous system by his day's work, whilst he who is half-crazed by the excitement of the boat-race may readily give himself life-long in-

jury. What is true of muscular labor is also true of brain-work. Labor without excitement is far less dangerous than work with excitement. The banker who struggles in the hoarse, surging crowd of a Black Friday does not do the intellectual work of a scholar's day; but it may be months before his nervous system recovers from the strain of that one day, in which anxiety and excitement have had the supremest mastery. Under these circumstances, health and fortune are but too often wrecked together. Nervous exhaustion is very frequent amongst brokers and stock speculators, but not more so than among those whose speculative operations are based upon grain, gold, or any other form of property. Stocks are more easily handled and transferred than most other valuables, and offer accordingly more temptation to the gambling spirit. It is, however, speculation, and not what it deals in, which marks the transaction. Speculators are often said to have broken down from overwork. In most cases, however, the man has really performed but little mental, and absolutely no physical, labor. He has been crushed, not by work, but by emotional excitement.

Here we come upon a most important factor in the nervous destruction of modern life, which has not before been noted in this Primer. Intellectual work without excitement rarely kills, and only after years of almost continuous labor. Even when

there is a moderate degree of habitual excitement, death from overwork is a very lingering one. The acute danger is confined almost exclusively to excessive emotion. Why excitement renders work dangerous, it is not difficult to see. As already stated, excitement benumbs *feeling*. In other words, the attention of the patient is so riveted by the object which causes the excitement, that minor attractions are unnoted. The excitement prevents the brain from perceiving the sense of weariness which warns that the limit of safe labor is reached, and that the time has come for rest. Then, again, in intellectual as in all other forms of work, speed is attained only by the exercise of great power — the difference of effort on the part of the racer during the contest, and of a cart-horse drawing the sulky which was used in the race slowly round the track, is patent. A moderate amount of excitement probably does no greater injury than by increasing the speed and time of work.

In intense emotional excitement, the case is far otherwise. It is inconceivable that any momentary intellectual effort should permanently injure a man; it certainly is conceivable that a sudden emotion should kill a man, and for it to seriously injure a person is not of rare occurrence. Did any man, by thinking, ever change the color of his hair in a night? Fright has undoubtedly effected such a change. Every physician in large nervous practice must have seen

hysteria, St. Vitus's dance, or other severe nervous disease, developed by fright. Some little time since, a child was brought to me by her parents with this statement: The girl, apparently in perfect health, went on a summer afternoon to walk in the country. Overtaken by a sudden thunder-gust, she took refuge under an oak. A violent stroke of lightning felled a tree in her immediate vicinity, and in a few hours she was suffering from a severe chorea (St. Vitus's dance), which required months of careful treatment for its cure.

The method in which emotion acts upon the nervous system is probably complex. In the first place, it seems to me clear that in some way, not, perhaps, at present to be understood, the molecules of the protoplasm are directly affected. The stoppage of the heart by fright or sudden fury, and the rush of its movements in anger, are familiar proofs that emotion paralyzes nervous action, or provokes intense discharge of nervous force. The depressing effect of long-continued, severe grief can hardly rest upon other foundation than a slow change wrought in the structure of the nervous system by the influence of the emotion. With an instrument to measure the force with which the blood moves in the arteries, it is easy to demonstrate that physical pain produces an immediate discharge of nervous energy.

But the result of excessive emotional excitement

does not solely depend upon the causes alluded to. The excitement which strong emotion produces may be so intense as to be, in itself, a direct source of peril and injury. In this excitement the speed of the nervous action tells. Then, again, in many cases, there is an alternation of conflicting emotions. This is notably the case of the broker or stock speculator. Indeed, in almost all cases of persistent, strong emotional excitement, joy and fear, hope and anxiety, continually alternate. These sudden transitions make the brain comparable to an engine which is being run not only at its utmost speed, but with continual reversals, which strain its every part.

Under the influence of strong hope, the heart's action is intensified, and the force of the circulation increased; whilst by fear the heart is paralyzed. Consequently, there is a continual varying of the pressure of the blood in the closed cavity of the skull, so that the brain suffers upon a Black Friday not only from its own intense molecular oscillations, but also from a continual varying of the blood pressure upon it. The mechanical influence of the sudden alterations of pressure upon the brain, under the play of conflicting emotions, is evidently one source of peril, and is, perhaps, not sufficiently recognized. Some time since, in my experience, a gentleman who had failed in business, and whose sensitive nature had suffered intensely because he was dependent for

the necessaries of life upon his friends, unexpectedly received, whilst at the table of an intimate associate, a valuable government appointment. He ceased eating, and a few minutes later went to his boarding-house, and up-stairs to his room. A short time afterwards he threw open the window and yelled murder into the night. Attracted by his cries, some persons entered the house, rushed up-stairs, and found him lying upon the floor. He had just sufficient consciousness to state that some one had hit him upon the side of the head; in a few moments he became unconscious, and soon died. The circumstances were such as to render it certain that no one had entered his room before the alarm which he had raised. He had, consequently, not been struck. There was no external bruise, but at the post-mortem examination a vessel was found to have been torn upon the side of the head on which he had said the blow had been received. Unquestionably, the sensation of a blow was produced by the sudden outpouring of the blood into the brain. In this case the walls of the blood-vessels were certainly weakened by disease, and it is possible that this disease was in part due to the long-continued despondency. Certainly, the sudden passage from this condition of low spirits to one of great exhilaration increased the force of the circulation. The weakened arterial walls being una-

ble to resist this, gave way, and the blood escaped into the brain.

In worry, not work; in excitement, not calm intellectual labor, lies the greatest peril. Nevertheless, the calmest intellectual labor may become excessive toil, and most men have to perform their brain-work under more or less excitement. It is therefore essential to study how the greatest amount of labor can be performed with the least possible strain or injury to the nervous system. Of course, the rule to reduce the excitement to as low a point as is possible must never be forgotten. Again, if excessive excitement be endured, prolonged rest must follow it. The rest is not solely required for the recuperation of the nervous protoplasms. The excitement, of course, causes an afflux of blood to the part; the blood-vessels are dilated to their utmost. So soon as the excitement subsides, they contract more or less completely to their normal calibre. If the distention of these vessels be too severe or too prolonged; or if, what is a more real danger, the dilatation be too frequently repeated at short intervals, damage is wrought by the constant stretching of the coats of the blood-vessels. This weakness thus generated prevents the arterioles from recovering their normal condition or tone. Thus gradually is set up a state of habitual excess of blood or congestion in the brain. For it must be remembered that the force of the blood current tends

everywhere to stretch weak vessels, to form, as it were, pools and bayous in every place where the channels are opened out to them. The more closely this subject is investigated, the more evident becomes the need of a rest after labor, proportionate in extent not only to the labor itself, but to the excitement under which it is performed. The nature of the rest thus required will be fully discussed later; at present, we must examine the laws in obedience to which the brain shall be enabled to perform excessive work with the least possible injury to its structure.

If any machine is being run to its utmost speed, great care is exercised to diminish resistance and friction to as great an extent as possible. The good mechanic keeps the cutting-bar of his planing-machine as sharp as possible; a well-drilled sawyer neglects not the teeth that chew their way through the log. The thinking machine — the brain — works with certain tools. It is clear that, if these tools or instruments be dull or out of order, an enormous loss of power must occur in using them. The most important of these tools of the brain are the special senses. It is of the first importance to have the organs of the special senses in good order. The machinist who neglects his tools is usually considered a "poor tool." Yet there are hundreds of brain-workers who never think that they are using tools at all, much less what those tools are and in

what condition they may be. Perhaps most of those who have ever overworked their nervous system until a state of general nervous irritability was reached, have noticed how annoying it is under these circumstances to listen to a person who speaks indistinctly. Many have no doubt suffered, from the effort to see or hear that which is indistinct, an almost unendurable increase of nervousness, without knowing why the effort was so irritating. The reason is not, however, far to seek.

The history of the recognition of a spoken word may be briefly summarized. An impression is made by the moving air upon the drum of the ear. The membrane vibrates, and its movements or vibrations are propagated along the auditory nerve in the inner apparatus of hearing until they are registered upon certain nervous ganglia, or collection of nervous matter, at the base of the brain. If this registration be distinct, sharp, clear, the higher perceptive organs of the brain read it without difficulty, and the listener becomes conscious of the word without an effort. If, however, the intonation be indistinct, the perceptive organs are only able, by a decided effort, to decipher the blurred image recorded in the lower brain. This effort normally may not be painful; but if the brain be exhausted, then the increased nervous irritability is the indication of the effect of the strain. The increased mental effort necessary in imperfect

hearing is very perceptible to most persons who are listening to a foreign language which they know well by the eye, but to whose sounds the ear has not been well accustomed. To the partially deaf, a similar effort is necessary in following an ordinary conversation. Hence partial deafness adds materially to the brain strain in an intellectual worker. In the case quite recently, of a lawyer of some note, wax in the ear exerted a perceptible influence in the causation of a general nervous irritability and weakness, which was fast impairing professional usefulness. A syringe for the ear and a pair of spectacles for the eyes made a happy man, and secured a considerable addition to the family income.

The most important of the perceptive instruments of the brain, that which is most used and most apt to get out of order, is the eye. This organ is wonderful in its constructive adaptation to its duties. But, as it exists in civilized man, whilst theoretically all that can be desired, practically it is often very imperfect. There are, in fact, as few perfect eyes as perfect sets of teeth.

An image falling upon the front of the eye is brought to a focus upon a certain nervous expanse called the retina, at the back of the organ. The impression made upon the retina is transmitted to the nervous ganglia at the base of the brain and there registered, to be taken note of by the higher centres

which preside over conscious visual perception. If the rays of light be accurately focused upon the retina, a sharp image is there formed; the retinal impression being clear and distinct, that at the base of the brain is correspondingly so. Under these circumstances, the perceptive organs read without labor what is passing in the outer world.

It is plain, that if there be optical defects in the eye, the retinal image will be indistinct, and only by an effort will the upper brain be able to recognize the blurred record made upon the lower brain. Moreover, there are certain muscular structures within the eye whose function it is to alter the position of the ocular lenses so as to accommodate the eye to seeing objects at various distances. When there is any physical defect in the eye, these muscles are continually straining in the endeavor to make up for the optical deficiencies.

The muscles become wearied out by the incessant overwork and act irregularly; possibly they fail from paralytic feebleness to change the focusing of the eye to suit the ever-varying needs of ordinary seeing, or more often the movements are rendered irregular and restricted by cramps. As the result of the muscular disorder, the image on the retina is further blurred, and the brain suffers more and more. It is also very probable that the imperfectly focused image acts upon the retina itself as an irritant, in the course of

time affecting its structure and impairing its power of transmitting the image to the brain. In the beginning, the eye trouble is only an easily remedied mechanical defect; uncorrected, in the end, it may become a serious implication of the whole eye.

This process of eye-strain and brain-strain may go on unrecognized for years, until at last the individual is arrested by the giving out of the brain, or by the retinal irritations becoming so severe that vision is no longer endurable. In the great majority of cases, however, Nature does not play this trick upon the person who is insulting the law of his being, but gives an abundance of warning in the form of headaches, etc. Eye headaches are usually referred to the brow itself, but sometimes to other portions of the head. Pain in the brow or in the eyeball, inability to read at night without discomfort, the fact that an evening spent in the dazzling glare of a theatre is followed by a morning of headache, a slight indistinctness of vision, or sense of weariness or effort in seeing, any of these warnings ought to be sufficient to send the brain-worker post haste to the oculist.

To dwell upon the propriety of avoiding unnecessary work seems to be giving utterance to platitudes. Not so long ago, however, I saw a grain merchant, of large connections, who boastingly said, "Doctor, I go on 'Change, buy and sell thousands of pounds' worth of wheat, flour, etc., and never take note of a

transaction until my return to the counting-house, when I dictate to the clerk, who writes it out. In twenty years I have not made a mistake." This no doubt showed the possession of a very good memory, but it certainly revealed the existence of a very poor judgment, or the absence of proper thought. The memorizing was really an added strain which was unnecessary, and none the less real from being unfelt. It was a most foolish addition to a sum of labor which, in its final footing up, proved too much for the brain of which it was required, and rendered mental bankruptcy inevitable.

A very common form of unnecessary labor on the part of authors is the unnecessary use of the pen. There is a physical fatigue of the arm which reacts most powerfully upon the cerebral territory which directs that arm. Most of my readers know something of the so-called writer's palsy or writer's cramp, in which the muscles of the forearm strangely lose the power of guiding and driving along the pen, although capable of wielding the blacksmith's hammer. This affection is largely a local one, and is usually looked upon purely as such; but I am sure, at least in some cases, it is connected with more deep-seated exhaustion of nerve power. I have seen it in the clerk, who showed no signs of brain failure, and I have seen it in the hard-worked scientist, as the first symptom of a progressive general failure of nervous energy. This

would indicate what experience teaches to be true, that the mere physical act of writing aids in using up the vital powers of the hard-worked author. Any one who has ever employed an amanuensis long enough to become accustomed to the habit of dictation will, I think, confirm the much greater ease of composition in this way than with the pen. If the amanuensis be a short-hand writer, speed as well as ease is gained.

As excessive emotion is so much more injurious to the brain than excessive work, it is of primary importance to the brain-worker to control the feelings. This is true both of sudden paroxysms of passion and of long-continued states of feeling. No less a physiologist than John Hunter is said to have lost his life by allowing himself to get angry, although he well knew that the strain of passion was very dangerous to his diseased heart.

The danger from over-ambition and anxiety is much greater in some countries than in others, especially in those in which life is somewhat unsettled, and which present great possibilities for work and advancement. Few things strike the traveller more forcibly, when moving through Germany and other continental countries, than the patient, and even happy, contentment of the people with a hard lot as compared with the feverish discontent he comes in contact with, say in the United States of America.

Many of my readers may say at this point, this is very true, but we cannot control our mental states. Here it is, however, where men overlook the influence which they have over themselves and their destiny. If a man believe in the Christian religion, he has no logical excuse for discontent and over-anxiety. It is taught that there is a good Father, who watches over each person who tries to do right, and so takes care that all shall in the end work for his good. Any one who really believes this with a tithe of the force that the religious melancholic believes that he is doomed to eternal woe, is, by his belief, not only rendered calm in danger, but happy and contented in adversity. All over-ambition and anxiety must be rooted in want of resignation to suffer in the present for future good, or in want of absolute trust in the truth of Christianity. The few people, who are not willing to labor in the present for future competence and happiness, are mostly those whose physical natures shelter them against over-anxiety; and, in the vast majority of cases, lack of real belief in a Divine Providence is the true cause of the discontent which, in so many cases, helps to wear out the mental powers.

On the other hand, if a man can gain no comfort from a Christian faith, he yet can do much to lessen the emotional strain upon himself. Many persons obtain some solace from other philosophies than that of Christ. Fatalism really does at least benumb the

sensitiveness of thousands of the race. The futility of striving against the inevitable has, to some minds, an effect comparable to that upon consciousness of the first violent blow the maniac deals his head as he rushes against the wall. It is not, however, to such points as these, but to the more indirect methods in which a man may mitigate the effects of emotional strain, that I want especially to direct attention.

There are but very few men who cannot, by a direct act of the will, control their anxiety and ambition, at least in some measure. The man who does not exert his will to influence his temper, is not much respected by his fellows. We teach our children from childhood the necessity of such control, and exercise them in it. If a sudden emotion can be totally suppressed, a more continuous one can be kept under. This truth should be taught everywhere. Men need to learn that by an effort they can inhibit anxiety as well as anger.

One rule, into whose observance most men can train themselves, is to avoid business cares out of business hours. The man who carries his load eight hours a day, will carry it longer than he who bears it eighteen hours out of the twenty-four. There are various helps at hand towards this relief — the collecting of postage-stamps, the game of whist, the following of some natural history study, the opera, a

thousand methods of diverting the attention and causing the mind to forget its strain, will suggest themselves. In these methods there is, of course, diversity of value. This shall be discussed in the next chapter. At present, attention is only called to the fact, often lost sight of, that by direct and indirect means cares can be laid aside, and that the proper doing of this makes an enormous difference in the working power of a man.

This very day I was consulted by a gentleman, who said: "Doctor, I swore to sift a certain matter to the bottom, and kept thinking and thinking about it, until here I am." It is exactly such action as this against which I want here to protest most strongly. The saddle that is never off soon galls. Systematic, purposive, wilful laying aside of care and work is a necessity to him who would accomplish his utmost.

Before passing to the subject of brain-rest, it is right to speak of a fruitful cause of brain-failure and of general shipwreck in life, namely, severe work at *too early an age.*

During all the early years of life, the cerebral mass is, for several reasons, excessively liable to evil results from overwork. When the child is born, the brain is only so far developed as to be the seat of an impulse to reach for the breast and extract nourishment therefrom. By and by into the sodden countenance comes an expression of consciousness. The child

begins to feel, to hear, to see. From that time forth development of the brain goes on rapidly. This development, it must be remembered, is not a mere growth, but a constant unfolding of latent powers — a continual progress into a higher and higher life.

It is not necessary to show how, under these circumstances, overwork is especially dangerous. The terrible possibility of diverting to the needs of labor energy which should be spent in development, and thereby dwarfing the brain itself, is never to be lost sight of. No real work should ever be required of the child under six years of age. Many children can learn without work. Play that teaches, as in that modern improvement for very young children, the Kindergarten, does no harm. As the child progresses, short hours, and strict attention during them, should constantly be the aim.

The amount of work to be undertaken by the young student depends very much on his age. It is foolish to expect from a lad of fifteen as large an amount of work as is undertaken by a scholar, say three years older. The pressure that is put upon an ambitious boy at most of our higher institutions of learning is very great; some of the young men break down at once — not, perhaps, suffering from any nervous disorder, but dying of consumption, or other disease of the constitution. Other men pass brilliantly through their college career, and

afterwards disappear; whilst late in life to the front come men whose lives at college have been not distinguished at all, or more distinguished for "larking" than for study. This is, in part, no doubt due to the fact that those qualities of mind or character which give pre-eminence in the school-room, are often not those which yield the richest fruit in later life. The power of acquiring knowledge is the faculty which puts the schoolboy at the head of his class. Very often it is not associated with the power of using knowledge to advantage, or with the judgment and foresight which are so effective in the world's battles.

Again, in many cases, the young man does not stand forward in the college course because the motive power is wanting. The praises of the teachers and older friends are no stimulant to him; the plaudits, the petty honors, are to him very little, compared with the joyous life of the playground. When, however, the struggle for existence comes, and the pressure of real life is upon him, the motive is furnished,—the latent, perhaps unsuspected, abilities are aroused, the energy of play becomes the power of work. Though these and similar reasons will account for some of the cases of failure of youthful, brilliant promise, it can hardly be doubted that, in other instances, there has been an arrest of brain development, produced by too severe use in early life.

The injury thus wrought in the young brain by excessive study may not be apparent at the moment, though, for this, it is none the less real. There have been numerous cases in which the brain of the studious child has developed rapidly for awhile, and then suddenly ceased to expand. It is perfectly conceivable that a too rapid growth shall give an imperfect result. Very rapid increase in other portions of the body than the cerebrum often results in imperfection, and it would seem as though, in the class of cases just spoken of, the brain has developed so rapidly that its tissue is not perfect; or, perhaps it has exhausted all its developmental force, so that, instead of increasing in functional ability during the fifteen years succeeding college life, it barely maintains its hastily-acquired development.

There has been of late years a vast deal of attention paid to female education, and the co-education of the sexes is the fashionable reform. The muscles of the average man weigh just so much more than do the muscles of the average woman, and the brain of the average man just so much more than does the brain of the average woman. When woman can compete with man in muscular contest, she will probably be able to compete with him in intellectual rivalry.

Every physician in large city practice must have seen the sad results from the endeavor to put a man's work upon a woman. Among the saddest wrecks of

our modern civilization are the faded, heartless, helpless, and hopeless women who have been driven to ruin by the stern necessity of daily bread; but, perhaps, sadder than these wrecks, because more unnecessary, are the sacrifices to the Moloch of excessive culture made of their daughters by men of wealth and position.

That co-education of the sexes does not work more injury than it does, is largely due to the fact that woman ripens earlier than does man — that the girl of eighteen is, in physical maturity, fully equivalent to the youth of twenty-one. As a result of this, at the ages of college life, the female brain is more mature, and proportionately tougher, than is the male brain. The girl is nearer the work-level of the boy than is the woman that of the man.

This is not the place to discuss woman's work in the world; but, because I have just said what seems to me both important and true, though to many it may be unpalatable, I may be allowed to express my sympathy with every effort to extend the opportunity of women to make a comfortable livelihood — a sympathy which does not prevent surprise at the direction of much of the modern movements. The legal and the medical professions, among the most wearing of all callings, have been invaded; but pharmacy has been left until within the last few years entirely to men. The duties of a druggist are exactly such

as trained women would meet men in as their equals, or even as their superiors. The power of pleasing, combined with deftness and accuracy of manipulation, and with the ability to be physically content with a sedentary life, are the qualities required by the druggist. Surely, these qualities abound more in the weaker than in the stronger sex. The almost total neglect of such a field, and the preference for professions characterised by infinitely more toil and exposure, seem not a little remarkable.

If this subject were not so foreign to the object of this Primer, I would like to discuss it in detail. Almost daily my walks lead me into a large publishing-house, with, perhaps, twenty clerks, and but one woman among them. In most of the large mercantile establishments in this country a similar state of affairs prevails. Why the so-called mercantile colleges should not include both sexes among their scholars, is not at all clear to the average professional mind.

The learning of the lesson of not over-taxing the brain before its full maturity is as important for early manhood as for childhood. Before thirty years of age, great business care, anxiety, or excitement is doubly dangerous, because the brain is not yet toughened for its work. Under that age there are very few who are capable of bestriding the Pegasus at hand, be it in politics, in business, or in professional life.

The aged face toddling about with some diminutive newsboy, into whose half a dozen years want has compressed the misery of a lifetime, is pitiful enough. But more peculiarly painful is it to watch, as it has been my fate to do, the face of early manhood deepening its lines to those of age, under the shadow of a great toil and responsibility. The largest proportion of persons who really break down under the pressure of work, are furnished from the ranks of young men. The veteran of many a conflict, toughened and benumbed by his years of labor and anxiety, carries easily a load of care and responsibility that at thirty would have crushed him.

This long chapter is at last ended. What in a few words are the lessons which I have striven in it to teach my fellow brain-workers?

1. To avoid excitement and emotional disturbance as far as possible.

2. To take proper rest, one proportionate to the labor.

3. To keep in order the instruments with which the brain works.

4. To avoid unnecessary labor and worry.

5. To avoid over-taxing the unmatured brain.

Very simple common sense rules, of which most persons will say "I know all that," but of which most persons, and possibly among them the writer of this Primer, are, to a greater or lesser extent, habitually disregardful.

CHAPTER IV.

REST IN LABOR.

THAT labor necessitates rest is evidently as true of the brain of man as of the muscular system. But as brain-work is more complicated than muscular work; or, in other words, as the cerebral organization is more complex than that which presides over locomotion, so does it become more difficult to determine exactly the nature of its proper rest. What I have to say upon the subject seems to me best arranged under these headings: Rest in Labor, Rest in Recreation, Rest in Sleep.

Rest in Labor.—If it were possible really to obtain for the brain true rest in labor, then would it be possible to work on uninterruptedly without fear of exhaustion. Plainly to do so is impossible; in labor complete rest is not to be found, but the phrase is allowable; because there is this much of truth in its wording, namely, that there is work which is much more laborious than it should be; and because the heading serves well to open the discussion as to the method in which the brain can be induced to produce

the largest fruit with the least wear of its tissue. In a measure, the ground of this discussion has already been covered, but care will be exercised not to repeat unduly.

There are certain laws which govern all nervous centres, and under which the thinking part of the brain acts as closely as do portions of less exalted power. One of these laws is that of habitual action, which may very well be expressed as follows: *When a certain series of nervous acts have once taken place, there is a tendency to their repetition, the tendency growing stronger and stronger as the number of repetitions is increased.* If it were not for this law, education would be of little value. The child learns with pain and difficulty: as the habit of fixing the attention is formed, and the memory strengthened, in familiar speech, by *use*, learning becomes easier. The musician at first plays the piece with slowness and fatigue, but soon his fingers run over the strings almost automatically. This gain is, for the musician, not only in favor of the individual piece of music, but also of musical methods, and of the general facility of playing. By repetition, not only is the habit formed of playing easily the single piece, but also to a less extent of playing a certain style of music, and to a still less degree all music.

This law of habitual action is so imperative, that it governs not only the correct movements of the cere-

brum, but also its disease processes. Epilepsy is a familiar and most striking instance of this. Usually, this affection is dependent upon a cause which cannot be reached; but it may originate in an injury to the head, a splinter in the flesh, a worm in the intestine, or other tangible something. If a patient suffer from epilepsy due to a removable cause, and this cause be taken away, very rarely do the fits cease at once. The paroxysms recur, although the original point of irritation is no longer present, because the nervous system has formed the habit at certain intervals of exploding, as it were, a mine of energy; or, in simpler language, the fit recurs because it has occurred so frequently; and the longer the series of fits before the removal of the irritant, the less the chance of breaking up the acquired habit.

A plausible explanation of these facts is not hard to find. Mental action, as has been insisted upon, is always accompanied by molecular changes in protoplasm. Memory consists probably in a permanent setting of some of these changes. Learning a piece of music, or learning anything, is probably a casting of some of the protoplasmic molecules into a particular form. In complicated acts, like piano-playing, there is further a use of a certain number or portion of the infinite multitude of nerve fibres which join the nerve centres together. Every time these nerve fibres are traversed, they become more permeable to the

nervous impulse; the road is at once opened up; crooked places made straight, roughness and obstacles smoothed out.

Thus a certain succession of musical "impulses" strike the ear time and again until the tune is learned, *i. e.*, until these impulses have not only so affected the brain cells as to be recognized by the consciousness as familiar, but also to make an impression so deep that it is a permanent photograph on the brain cell. In the musician, the brain cells, or protoplasm, in playing the piece of music, give origin to a complicated series of impulse, which travel out to the fingers and their guiding muscles. When a piece of music has been learned by memory, the notes, by the repetition, have been permanently registered on the brain protoplasm, and the various pathways of nervous discharge have been travelled so often that these registered impulses once set in motion again flow down the well accustomed roads without any direction from consciousness. It is perfectly possible for a man to play as automatically as does the music-box.

Whatever may be our theory as to the mechanism involved, the fact is indisputable, that the brain works with most ease in the manner in which it has been accustomed to labor. This is especially true of the organ as it grows older. The proverbial difficulty in getting new ideas, or rather new methods of thought, into old men, is evidently due to the physical structure of the organ having become too set and rigid to allow

of new channels of communication being formed, or, in other words, of new ways of thinking; for it must be remembered that every new way of thinking is associated with a new way of movement in connecting fibres and the protoplasm of some brain cells. The reason it is so difficult for an old brain to remember new things is doubtless similar. There must be an end to the physical possibilities of photographing one impression upon another, even in an organ offering so many millions of sheets as does the brain. More than this, with age comes stiffness and rigidity, and not easily does a new impression leave its mark upon a mass of protoplasm which has been hammered into hardness by the incalculable imprints of seventy years of active life.

The law of habitual action is especially to be borne in mind in regard to training. The finest effects of training in most persons are to be gained only before thirty years of age, and even after twenty-four in many people comparatively little is to be accomplished. This, of course, applies especially to methods of brain acting such as ways of thinking. He who has never been a student until he is twenty-four years old, will rarely become one. To a less extent it applies also to mere physical skill. A German manufacturer said not long ago to the writer, "Our workmen are losing their skill because, in the new generations, their time from eighteen to twenty-one is given up entirely to the military service; and from twenty-one

to twenty-four one-half of each year is similarly used. When they do get free, they are too old to learn."

It is also owing to the law of habitual action that new work is so difficult to the middle-aged or old. Whenever a man past forty years of age is tempted to enter into new fields of intellectual activity, he should remember not only that the danger from brain strain is far greater than if new methods of work were not put upon his cerebrum, but also that the chances of success are not nearly so great as if he had started younger. It is very common to see oldish men, who have retired from business with a fortune, becoming restless from want of occupation, engage in enterprises of a character to which they are not accustomed, and fail. The reason of the failure in such cases is not lack of ability, but the fact that old brains, accustomed to one line of work, have been unable successfully to compete in another line with intellects more youthful or more appropriately trained.

The law of habitual action holds to some extent in regard to times of work. Theoretically, at least, it is better to have stated periods for labor, for rest, for recreation. Even in the case of methods, some brains remain flexible much longer than do others; and in regard to the regular alternation of work and rest individual differences are very great. Some

minds are systematic from birth; in others, system is impossible; in others, it is acquired. Whether the peculiarities of the brain are inherent or acquired, they are to be consulted; and so long as they do not contravene any important law the brain works most easily in obedience with them.

One man studies most fruitfully at night; another finds that he can write most easily in the early morning; the former is prone to assert that the night is the best time for intellectual labor, whilst the latter waxes eloquent concerning the advantages of early rising; and if he be a doctor, like enough what suits him must suit his patients.

The truth is that there is no inherent indisputable superiority for brain work of one time of the twenty-four hours over another. Our laws are all made during the night watches, although the day is seemingly the natural period of labor.

In the far north, men exist and prosper working and sleeping alike during months of uninterrupted daylight. The human organism needs exposure to light; provided it gets sufficient of that, it makes no difference *per se* whether its work is accomplished at one period of the twenty-four hours or another. It is therefore not so much the time of work as the regularity of it, which is to be thought of.

Systematic arrangement of the time, regularity of work, is to some minds very important. It is, however, largely dominated by what we may term

mental individuality. There is no doubt that most brains of power have individual characteristics in their manner of working as well as in the character of their work. Whether these have been the result of circumstances, or are inherent to the peculiar organization of the brain, does not matter so far as the present question is concerned.

These acquired or congenital peculiarities are, as already stated, of great importance. Much can often be done by effort to alter them, but sometimes they are unconquerable. Indeed, it has seemed to me that the more powerful and more original a brain is, the more apt it is to be a law to itself. The minor laws of mental methods are especially dominated by these peculiarities. Habits of systematic work, so important to some, seem impossible to others. There are people in whom the cerebrum will only produce in its own times and seasons. The rule of conduct for each brain-worker is to study carefully the instrument he uses, and, if it be possible, to bring it into a systematic method of work, or into some method best suited to his peculiar circumstances. It may be allowable to cite the author's own profession as one in which it is necessary to train the brain away from methodical study and work. The literary or scientific physician, busy in practice, must acquire the habit of writing, or reading, or thinking, at odd moments; before dinner, or in the carriage jogging about the streets, or in the

office between the visits of patients. The power of great accomplishment under the circumstances of a medical life is almost always based upon the power of taking up a subject at once, pushing it along and dropping it in a moment. According to the nature of his brain and the needs of his position in life, so must the brain-worker use his judgment to control and train the wonderful instrument which has been given him to work with.

Rest in labor is to be obtained to some extent by proper variety in work. There is an old saying that when an Indian gets tired of walking, he runs; and when a horse shows distress in a race, to break him up for a few minutes, *i. e.*, to change the pace from trotting to running, is a favorite device of jockeys. How far it is practicable for any individual to carry out the indication of which I am now speaking, must be left to the decision of his own judgment. I am, however, well convinced that the clerk who strains over long columns of figures every day, for hour after hour, is really wearing himself much more than is he who interrupts his labor with tasks of a different character. It is not difficult to invent a theory that shall explain the beneficial results of variety. Precisely as in the horse, different muscular movements are called into play by varying the pace, so in the case of brain-work, different cells and fibres are in all probability employed in different sorts of mental action.

CHAPTER V.

REST IN RECREATION.

LONGFELLOW'S Miles Standish, at the head of his Puritan bands, roaming the wild woods in search of the wilder savage, no doubt would have smiled grimly had any one suggested that recreation of some sort is a necessity for the highest development of man. Mayhap, however, sturdy Miles himself tingled with a profane joy as he smote right vigorously those enemies of the Lord—the red Indians. Certainly, the fathers who nursed our good old English tongue in the perilous days of its infancy, before it had girded itself with strength for the conquest of the world, better knew the value of joyful forgetfulness of care. Well did they call it a re-creation.

Much that passes for enjoyment in this world, so far from being a re-creation, is, in verity, a dissipation —not a gathering, but a scattering, of force. Some years since, a young lady giving an account of a trip amidst the finest scenery of the world, said, enthusiastically, "we thoroughly enjoyed ourselves. We danced every night until near daybreak, and

never came out of our rooms till it was four o'clock in the afternoon." Evidently, even re-creating would be of no avail in such a case. There are, however, numbers of sensible people who are not aware of the principles which ought to underlie all pleasure-seeking that is intended to aid in gathering force.

To those who have not any special object of thought or life, pleasure-seeking is only a means of "killing time," of getting rid of the monotony of existence; but to the brain-worker, the hours of pleasure must be made to yield as much of profit as is possible. Life being an earnest effort, enjoyment must be earnest, and act in unison with labor to a common end.

The first principle to be borne in mind is that joy, pleasure, all similar emotions, are really mental stimulants, aiding — it may be by increasing the flow of blood to the brain, or, perhaps, by a direct stimulant influence upon the cerebral protoplasm — in the building up, restoring, and general repairing of the waste which has been wrought by excessive work. Hence is deduced the first obvious law governing the seeking of recreation — *pleasure must be given by the pursuit.* This obvious truism is by no means always remembered. What school-girl does not recall some dreary hours of stupid "constitutional walks"? What exile for health some banishment to places where existence itself became a burden? Whereas,

a little effort on the part of the teacher might have filled the walk with interest; and a little care exercised by the doctor in selecting the place of exile might have made the time of banishment bright in after-life with pleasant memories.

There is no way of deciding beforehand as to what will give most pleasure to an individual. The personal equation is here supreme. One man finds his highest enjoyment in the prayer-meeting, another at the card-table; one passes his choicest hours in the calm languor of an ocean voyage, whilst to another, the excitement of the chase is almost the ultimate joy of existence. It is here perfectly safe to allow the individual taste the fullest scope consistent with virtue, and with certain physical and mental laws to be spoken of directly.

The more important of the principles other than that already mentioned, which should be borne in mind in selecting our habitual recreations, are included in the following sketch.

Recreation should not involve mental labor, especially labor of a kind similar to that of the working-hours. There is one especial breaking of this law, which is so frequent and so often injurious, that I must direct especial attention to it; although the condemnation of the abuse expose me to misinterpretation and unfriendly criticism. I refer to the turning, by religious persons, of a day which should be a Sab-

bath of rest and recreation into one of great labor—the hardest, it may be, of the seven. There are, in this city, plenty of school-teachers who toil in the secular school-room all the week, and in the church and Sabbath-school-room all the Sunday. To the business man, who ciphers through the week, measures tape, or studies how he can sell for two pounds John Jones's labor, that he has only paid one for; to the misses who, during the week, suffer from no greater toil than that of attending to a few household duties and making calls, Sabbath-school teaching may be a means of doing good to themselves, as well as to others. On the other hand, to the overstrained school-teacher it is a grievous injury. Teaching is teaching, whatever the subject may be that is taught; the mental methods are very similar, though the matter changes. The labor of teaching out of the Bible on Sunday is, for the teacher, a mere continuation of the labor of teaching out of the grammar or the geography on the week-days. Such a Sabbath-school teacher attempts to wring out of her organism, weak and nervous though it be, *seven* days' toil a week, in the very teeth of the commandment "*Six* days shalt thou labor, and do all thy work." She is wronging herself, and also those parents who tacitly agree to pay her for the best she can give their children on a week-day.

There is spread out for her the fields and the woods,

with their sunlight and shadow, with their pure air and physical joys. In them may be found a real Sabbath afternoon of calm recreation. Better for her, and for those committed to her charge during the week, that she gather there the refreshment and strength that shall enable her to carry the Sabbath-school lessons into her life, and scatter everywhere through the week what the woods and fields have given her on the Sunday.

The whole Sabbath question looms up here as a subject of discussion; but it is one not easily dealt with, and I dismiss it with the suggestion for thought that there is no *rest* out of sleep unconnected with recreation, though, when one is tired, mere sitting in a chair in quiet may be recreation.

Games have always been, and probably always will be, a source of recreation with large classes of people. They naturally divide themselves into out-door or active and in-door or sedentary games. When practicable, those pastimes which involve much muscular exertion are preferable for the sedentary student, because they yield the excellent fruits of exercise; but of such games I shall speak more in detail in the next section.

It is hardly necessary to say of sedentary games that they should suit the individual taste; but it is very necessary to point out that they should not contravene the rule laid down a few pages back in re-

gard to the laboriousness of recreations. All games requiring severe thinking ought to be looked at with suspicion by the man of active mental habits, and the more closely allied the mental action required by a game is to the habitual mental work of the individual, the more decidedly should the pastime be put in the background, even if there be a passion for it.

Of all games with which I am acquainted, chess is the one most enticing and requiring most of mental labor. It is absolutely to be condemned as a recreation to those whose life-work requires long-continued hard thinking. With the man whose chief strain is emotional, as is the case with many men in business, the thinking of chess-playing may do no harm, or even be beneficial. The game requires an entirely different sort of cerebral action from that which is habitual to such a business man. In regard to scientists, the case is different. I was once quite fond of the game, but found that the strain of its playing was fully equal to that of severe composition or of hard study of an abstruse science. After the work was done, it was only chess-playing, and experience soon led to a complete abandonment of the game. It seems, nay, it is, foolish to waste so much of mental energy on a pastime Such useless labor is only excusable in those whose life-work is enjoyment, whose strain is emotional, or whose day's work is a round of monotonous labor not involving

the higher mental faculties. A practical test of the value of a recreation, which may be applied to chess-playing as to any other pastime, is: "Do I feel brighter and more able for work after indulging in it?"

In the far extreme from chess are certain games which may produce an emotional strain by producing an excitement passing beyond proper recreation. The old gambler has become so habituated to irritation that nothing but the most severe prodding will even titillate his feelings. But to any but the hardened all betting upon games is a strain, which becomes more and more intense as the stakes become more and more valuable. Evidently, such a pastime in no way refreshes or strengthens for the next day's work.

There are various games which produce a decided excitement without passing the limit of possible good. In choosing from among these, it should be remembered that the rule heading this section here applies thoroughly; that he who has labored upon dry intellectual subjects is better in the evening for an emotional stirring up; whilst he who has spent his hours in the turmoil and excitement of the stock or grain exchange needs rather some calm intellectual pastime which shall restore his mental equilibrium.

Recreation should be made conducive to bodily improvement. This rule or proposition evidently con-

nects itself closely with the subject of exercise. There is perhaps no other one hygienic theme which in the last twenty years has received so much attention as has exercise, and concerning which so much twaddle has been written. In it some, who speak as those having authority, see the grand panacea for all individual ills as well as the hope of the perfection of the race. It does not seem to occur to these fanatics that farmers and laborers not only die as well as other people, but even appear to suffer nearly or quite as much during their earthly pilgrimage.

In order to understand how much or how little of good is to be expected from exercise, it is necessary to comprehend what takes place in muscular movements, and in what way they are beneficial. Voluntary motion of a hand and arm is the result of a complicated series of acts. Successive discharges of nerve-force occur, commencing in the upper brain and passing downwards along the spinal cord and outward along the nerves until the muscles are reached, and are called by the nervous impulse or force into action. It is a lesson not to be forgotten, that in exercise, not merely the muscle, but almost the whole nervous system, labors; and that muscular movements are just as truly a putting forth of nervous power or energy as are mental efforts.

It is next proper to get a clear idea of how exercise can do good; a knowledge of what is and is not

possible often serving a most salutary purpose in correcting extravagant beliefs and expectations. Researches made in the laboratories of Germany seem to show that the animal heat is chiefly, if not exclusively, generated in the muscular system. Animal heat, like the heat of the fire, is the result of combustion; not of a rapid, however, but of a slow combustion, or, as the chemist would say, oxidation. In combustion or burning, substances are destroyed, that is, turned into gases, etc., and returned to the air and earth. Now the blood has entering it from all parts of the body partially effete or used-up materials. If the recent theories be correct, one of the beneficial effects of exercise is in the destruction of these effete substances. The aid here is twofold; during exercise, the oxidation goes on most strongly in the muscles, and hence during the exertion there is an increased combustion of material which otherwise would clog up the system; further, the muscles are themselves kept in health by the exercise, so that the beneficial influence of the exercise is maintained during the period of rest.

Exercise also, without doubt, does good by restoring or maintaining the balance of the circulation. When an organ is in active work, the blood flows to it. A brain which is habitually worked to its full powers is flushed with blood many hours out of the twenty-four, so that there is always some danger that,

during the periods of quiet, the brain shall not be able to free itself from the excess of blood. In exercise, the muscles are in action, the blood is drawn to them, and thus the brain is relieved. Again, during many hours of every day of life, digestion is in full progress and the abdominal organs are full of blood. If there be no outside force to aid these abdominal organs, they in turn may not be able, during their period of rest, to get rid of their excess of the vital fluid. If brain-work and stomach-work be forced and the muscles remain quiescent, it is very likely that most of the blood of the body will be concentrated in the head and abdomen, and the individual suffer accordingly.

That exercise is capable of doing good to the man in other ways than those noted, we have no knowledge. Its beneficial powers would seem to be limited to its aiding in purifying the blood and in equalizing the proportionate amounts of the fluid in the different portions of the body.

On the other hand, it cannot too strongly be insisted upon that exercise is potent for evil as well as for good, and that when excessive it is certainly injurious. A famous athlete, Dr. Winship, when in his best condition, often fainted in a warm room; and it is notorious that a large proportion of professional athletes die early of lung and heart diseases. The reason of this is not far to seek. The heart and lungs

are naturally proportioned in power to the wants of the body. When, as was the case with Dr. Winship, the muscular system is preternaturally developed, a preternatural amount of work is required of the heart and lungs. Increase of the bulk of a man's muscle means also increase of the bulk of his blood, as well as increase of the territory to be travelled by that blood. Such increase of blood and territory demands an augmentation of power to drive the vital fluid through the system, and also to get rid of the gases of the blood. Only to a certain extent can the heart accommodate itself by enlargement to this, whilst there is no reason to believe that the lungs can largely augment the surface which they have for purposes of aeration. The probable explanation of Dr. Winship's fainting in a hot, close room, is that his heart and lungs, under the most favorable circumstances, had as much as they could do to meet the needs of the system, so that when the air became impure, they were unable to fulfil the requirements. At least, one of the reasons that men whose muscular systems have been preternaturally developed so often die of lung and heart diseases is to be found in the fact that these organs are, in such people, habitually overworked.

It is very important for all who are training children for brain-work to remember that an over-development of the muscles is possible. Artificial sys-

tems, like that of Dr. Winship's, in which the muscles are so cultivated as to be especially able for great sudden efforts, are peculiarly bad. Great momentary muscular strength and great endurance under continued exertion are by no means synonymous. They may be united in the same person, but it is possible to possess one without the other. To a peaceably disposed person, who is neither a butcher nor a belligerent, to be able to lift an ox is not extremely valuable; while to be able to stand a hard march of twenty hours' duration is almost invaluable, because such a march requires that endurance which enables a man to perform severe continuous labor of almost any sort. Violent sudden efforts, habitually repeated, are especially prone to develop the faculty of excessive momentary strength. Weight-lifting, health-lifts, and all similar forms of exercise are, at least for the child, an abomination, the practice of which cannot be too strongly condemned. What is wanted is protracted muscular work or play of a light character, to bring the habit of endurance. Boating, cricketing, out-door plays of all sorts, such as a normal boy of himself naturally is fond of, are probably in most cases the best means at command for training the embryo man. Only some little system should be given, even to play. The use of gymnastics for boys is, in some measure, open to objection, as the open air is the right place for play; but in our

climate during much of the year out-doors is not so attractive as it might be. Nevertheless, open air sports are certainly preferable when the weather is at all favorable. When gymnastics are practised, great care should always be taken to see that the exercise be not too severe to be persisted in for some time. No greater mistake can be made than having exercise of too severe a character. The human constitution is not made of iron, and there is no need now-a-days for training fitted for the development of a second Hercules.

What has been said of violent exercise for young people is also applicable to adults. Health-lifts and all forms of short, violent exercise should only be employed when time cannot be had for out-door exercise. They are, however, not so injurious as in the case of boys, because in the man the muscles are more set and less easily influenced in their development as to sudden or persistent strength. Nevertheless, horseback-riding, boating, hunting, and other forms of more gentle out-door exercise are, even for the adult, far preferable to these modern devices for cheating Nature by attempting to get the good effects of exercise at a less sacrifice of time than was intended. The only excuse that can justify the use of these methods or instruments is an impossibility of getting something better, and there are very few men whose

circumstances of life really force them to such make-shifts.

There are persons who hold that there is an antagonism between brain and muscle. The position is partially correct in that an extreme development of one is at the expense of the other. A Winship cannot be expected to have much brain power; and it is probably possible to develop a child who shall be as much a brain-monster as some athletes are muscle-monsters. Beyond this, so far as training children is in discussion, the truth does not go. The best man for doing a *life* of brain-work is he who has been in childhood symmetrically developed, and who has acquired all the endurance his constitution will permit of.

There is certainly in the adult some antagonism between hard physical and mental labor. Muscular work rests upon a putting forth of nervous energy, and the man who has exhausted his stock of nervous energy in violent exercise, cannot expect to perform a prodigy of brain labor. Did any one, in the evening of a day spent in following the hounds or tramping after a pair of pointers, ever compose a poem or write a sermon? The cup of tea or toddy, the easy chair, the cheery story, finish far better the day's work and prepare for the early bed. The converse of this I believe also to be true. In my own experience, I am sure that when engagements are such as

really to work the brain to its highest capability of production, exercise must be lessened or entirely done away with; only it must be remembered that, at this high pressure rate, the system cannot hold out permanently, and that after long spells of such working, periods of rest and recuperation must make up for the excessive consumption. Again, there are persons who are possessed of very active and powerful brains, although their muscles are feeble. In some of these cases it is a grievous mistake to inculcate the habit of exercise. I am acquainted with a very well-known brain-worker who was advised by his physician to live where he would have every day to walk backward and forward to his place of business, a distance in all of not more than five miles. The result of this was continued and progressive failure in the brain-power of production, with no improvement of the general health. Not until after some months of depression was the idea suggested that mayhap the exercise was not beneficial. When it was given up, not merely did the power of work return, but the health began to recover.

In persons of middle age, whose muscular system has almost wasted away from lack of use, any sudden resumption of active habits is not desirable. By attention to diet, by graduated exercise, the attempt should be made slowly and permanently to recover lost vigor.

How much exercise, then, should the brain-worker take to himself? From the propositions laid down a few pages back, it would seem a correct deduction that the proper amount of exercise is that which will keep the muscles in good health and which will enable them to meet the physical requirements of the rest of the body, *i. e.*, to remove from the blood all impurities and to draw from the internal organs the excess of blood in them. As with a good many other general principles, the application of this to the individual case is not always easy. But usually a man will be able to judge for himself by studying the condition of his muscles; if these are becoming more and more attenuated or fatty, less voluminous and more flabby; if the elasticity of step and carriage is growing less, more exercise is usually required. In dyspeptic cases, exercise is also often very beneficial in the relief of the stomachic distress.

Closely connected with the subject of exercise is that of the summer vacation. In the first place, it is proper here to insist upon the value of a periodical complete annual rest, a rest which should be proportionate to the severity of the winter's strain. Two weeks is the accustomed vacation in mercantile circles, but certainly is not long enough for ordinary purposes. A hard-working man will, in the long run, produce more for taking at least three weeks' holiday, and very often a month or six weeks' rest is a saving of time.

In the summer vacation, the end is twofold; first, to rest the wearied brain; second, to restore as far as possible the health of the muscles, of the digestive organs, and of any other part of the body which may have suffered damage during the winter's work.

It is usually the emotional as much as, or sometimes even more than, the intellectual wear of the brain which is destructive during the long year of labor, and consequently, during recreation, freedom from anxiety and other depressing emotions is of prime importance. When a man is so situated that he cannot take care, he is very apt to cease from care. The ocean voyager is completely cut off from the receipt of any news, and in this complete isolation lies one of the chief sources of the great usefulness of sea-travel. Home cares and home worries are left behind; but as the shore is approached, and with it the possibility of hearing of the progress of business and other interests, with remarkable alacrity the mind rises out of its apathy to take up the old burdens. The isolation of the man who buries himself in the country is not less complete than that of the voyager, and few of those who have spent their vacation in out-of-the-way places will not recognize the same freedom from anxiety that is felt upon the sea, as well as a reawakening of the faculties, when the busy city is approached, similar to that which occurs in the voyager nearing shor

Along with rest from anxiety and care during a vacation, it is well to get the active assistance of cheerful emotions. A jolly time is not merely an enjoyment; it is a benefit. A dull vacation is, in a great part, a wasted vacation. What affords one man pleasure is to another very tiresome; and it is the pleasure of the individual, not pleasure in an abstract sense, which is to be sought after.

There is a peculiar variety of pleasurable sensation produced by travelling, which aids very favorably in unbending most minds. But in this country the vacations are usually of necessity taken in the hot months, and railway trains, in a hot atmosphere laden with dust, are refreshing neither to the mind nor body. I have seen many persons come back from their summer trips more jaded and exhausted than before they started; simply used up, mind and body, by the fatigues of travel. This is, of course, worse than a waste of time, opportunity, and money.

What is true of travel is no less true of the life at many of our summer watering-places. Perpetual excitement, such as may be seen at some of our modern sea-side resorts, and the unceasing round of fashionable life, in the height of summer, are injurious in their physical tendencies in an extreme degree. Such a life ministers to a taste for excessive excitement that is very exhausting, and yields an annual harvest of nervous, hysterical women. For

tunately, the temptation to this mode of spending a vacation is felt only by a very limited class of brain-workers.

Passing these matters by without further discussion, it is necessary to say a few words more about the subject immediately in hand. The mental constitutions of people vary so much that, as with habitual recreation, so also with the annual vacation, no positive law of choice is possible. Under certain restrictions of physical and moral force, the man must be a law unto himself both in selecting the habitual recreation and also in choosing a vacation, and, with a due regard to his physical and mental needs, decide upon that which best suits his natural or acquired tastes.

Experience would seem to show that conditions of the atmosphere not appreciable to the physicist, have a most marked influence over the human organism. Sea air, mountain air, etc., really do appear to influence a man physically for better or worse, and in the choice of a spot for the summer vacation, their power must not be lost sight of. Here again individual peculiarities are inscrutable and triumphant. As a rule, no physician can tell with certainty beforehand as to whether salt or mountain air, a low or a high altitude, will suit a patient. Only by trial can the idiosyncrasies be made out. Most persons are able, from their own experience, to settle for themselves what suits them best, and should be

guided by their own knowledge. It is worth noting, however, that in a very large number of cases, the best results are obtained by alternating the sea-shore and the mountains — going first for two weeks to the former, and afterwards for two to four weeks to the latter.

The choice of the place in which a vacation is to be spent involves very closely the method or way in which the time is to be passed. In making the selection, it is important that the choice be guided, not solely by the direct needs of the brain, but also by the wants of the muscular, digestive, and other parts of the organism. The delicate man who so places himself that for three or four weeks he will be forced to live on sour bread and salt mackerel, will be very apt to reap the reward of his folly. He who goes to the sea-shore, to some fashionable crowded resort, and spends his days in bed and his nights in the ball-, bar-, or billiard-room, cannot expect to bring back muscles and other organs in improved health. He may himself enjoy such dissipation more than anything else, but his muscles and digestive organs do not find the same aid and comfort therein. The only things, leaving out of sight spring waters and other medicinal agents, that can modify the condition of the muscular system and relieve the digestive organs of an habitual excess of blood are abstinence, air, sunlight, exercise. The pleasures of abstinence are not best

enjoyed during a summer vacation, and nothing more need be said about them here.

The popular appreciation of the value of fresh air is very far from being as thorough as it might be. During military campaigns it is no rare sight to see sick men, who have been languishing in the ward of a hospital, suddenly improve when placed in exposed tents. The windows of the wards have been habitually kept open, but this is by no means as efficient as the perpetual air-bath of a porous tent. The more pure air the better, and by night as well as by day. There is this much of truth in the popular prejudice against night air — in malarious districts the air after dusk does contain more of the peculiar poison than does the atmosphere in the sunlight. But in high, healthful districts, night air is very good air. Of the value of sunlight, it is not necessary to say much. Sufficient also has already been said concerning exercise, and the method in which it does good. It is right, however, here to caution against a not uncommon abuse of exercise in the summer vacation. A man whose muscles are soft and flabby from ten months of disuse, cannot expect them all at once to equal the thews of a woodman or athlete. It is not uncommon for an ambitious young man to injure himself, or at least to fail of getting the good he ought, by working too hard, especially in the beginning of his trip.

CHAPTER VI.

REST IN SLEEP.

AS sleep is a state or condition of which most of mankind have sufficient of personal experience, it is hardly necessary to define it. Nevertheless, it is perhaps allowable to call attention to some of the more important of its varieties as well as to discuss its nature. I remember once having been utterly confounded in my attempt to make a very intelligent publisher believe that it is possible for one piece of ice to be colder than another. Ice was not only to his mind ice, but also the personification or realization of cold, and could not be colder. So with regard to sleep. To many minds it is the realization of rest, and only some unfortunate victims fully comprehend that there is a sleep which does not refresh, and has in it only the mockery of rest.

Probably every one who reads these pages can, however, remember moments in which he was himself hardly able to determine whether he was waking or sleeping. Periods of quiet, in bed it may have been, when, in endless succession, through the brain

whirled troublous or possibly pleasant dreams, scarcely affected by consciousness, though not absolutely freed from it; times when the outer world seemed forgotten, but had only half withdrawn itself, so that even the slight impression of a mosquito on the face, the rustle of the bed-clothes, the puff of air, served to recall all the bitter and the sweet of life. To very many persons this state is the prelude of true sleep; in times of sorrow or of anxiety it may be almost all the rest the sufferer can find. Then again there is a sleep that is a terror of unrest to its victim — when horrible dreams, or busy dreams — dreams of death, remorse, business — drive along in a hurried rush so vividly that the sleeping moments, when looked back upon by the memory, seem more real and full of life than do the waking hours. It is plain such sleep is not tired nature's sweet restorer. Certainly any one who has ever had a nightmare, when the death fray is lived through over and over again, when the whole being is convulsed with agony and the cold sweat starts from every pore, will agree that all sleep is not rest. Dreams have power to torture, to depress, almost in proportion as they are beyond our control. I well remember the pangs of being fed in a darkened chamber for a feast of cannibals; and the expiring look that my youngest boy, whom I had vivisected, once gave me, will never be forgotten. Sleep, there-

fore, is not always rest, but trouble, and a troubled sleep brings to the brain-worker loss of power of labor.

As sleep passes, on the one hand, into wakefulness, so, on the other hand, it may deepen into coma. Some writers speak of coma and sleep as entirely different. Possibly they are; and yet we cannot draw the line separating them. We call a condition of unconsciousness, out of which the patient can be aroused, *sleep;* one out of which we cannot awaken him, *coma.* A patient takes a small dose of chloral or opium. He sleeps, and is easily aroused. Increase the dose; again he sleeps, but is less easily awakened. Let the dose be larger still, and only by violent shakings, loud shoutings in the ear, and other excessive disturbances, can a degree of consciousness be restored, and the restoration is but momentary. A little more of the poison and consciousness has fled, it may be never to return; or by and by the coma grows less profound, the patient can be momentarily aroused, and after a time passes into a state of simple sleep. The sleep and the coma have been produced by the same agent, the opium or the chloral, and have, by insensible gradations, passed into one another. It would seem, therefore, difficult to believe that the states are essentially different from one another.

It is difficult, if not impossible, to decide fully in what lies the beneficial effect of natural, untroubled

sleep; but it would seem to be in the suspension of consciousness. I do not believe that the cerebral protoplasm ever ceases during health to produce thought. I am not able, it is true, to prove the truth of my belief on this point; but no one can disprove it, and the drift of the evidence seems to me to indicate that dreaming is always going on in natural sleep. Certainly, the forgetfulness of having dreamed is no proof that dreaming has not occurred. Any one who has slept with a person who, when asleep, habitually expresses his feelings in talk, must have heard snatches of conversation, even boisterous laughter or sorrow-laden sighs, of which, in the morning, the sleeper has had no memory. Again, most of us can call in mind some sudden waking, in which we have a definite, unmistakable feeling of an interrupted dream, but no knowledge of what the dream was. There are some persons who are such inveterate sleep-talkers that they will answer questions rationally in their sleep without awaking. I have known important secrets revealed to a bed-fellow, no memory of the talk remaining.

It is by no means certain that even in coma the "thought cells" cease their action. Other portions of the brain labor on through life. The centres which govern respiration maintain in continuous action the respiratory muscles. The brain cells which preside over the heart's action never cease

from their censorship. It is far from being proven that the rest to the mind during sleep is due to a cessation of activity in the thought cells; it is, indeed, most probable that no such arrest of activity occurs. Rest would seem to come largely from the relaxation of effort, from withdrawal of consciousness and of external impulses, and the consequent freedom for the protoplasmic movements to run on uncontrolled. In this way the balance of nervous energy may restore itself, a sort of equalization taking place between the various cells which have been irregularly constrained and active during the day.

As unconsciousness is so important an element in sleep, one of the best tests at our command as to the character and the real value of a certain sleep is to be found in its unconsciousness. The sleep which rests most is that which is quietest, and of which there remains no memory during waking hours. The sleep that rests most is that which the brain-worker especially needs, and the quiet, so-called dreamless sleep is that which he must seek.

From time to time various theories have been propounded to account for the production of sleep, and some of them have been made the basis of discussion as to the proper treatment of wakefulness. Of these speculations, there are only two of which, at present writing, it seems necessary to speak. According to the teachings of one of these theories, there is de-

veloped, by the activities of the waking hours and the consequent destruction of tissue, one or more substances or principles, which have a peculiar relation to the nerve cells, comparable to that possessed by morphia, by reason of which they lull the cerebral centres into sleep. The idea of this theory is, perhaps, more lucidly expressed by the statement that the destruction of tissue which takes place during mental and bodily exercise produces a narcotic principle which puts a man to sleep.

This theory rests upon no experimental or other evidence of any scientific value whatever. As the narcotic principle cannot be isolated, its existence is a gratuitous supposition. Sleepiness is by no means always proportionate to the waste of tissue during the waking hours past. When a physiological theory rests upon no firm foundation, and is at the same time unnecessary and improbable, it is best abandoned without too much waste of time or words.

The second theory is more plausible, and has received more wide-spread assent. It is that sleep is dependent upon anæmia of the brain, or, to speak less technically, upon the presence of less than the proper amount of blood in the brain. It is a well-known fact, that for a part to perform actively its duties, it must have an abundance of blood. Further, it is abundantly proven by the phenomena of disease, that if the supply of blood be cut off from a

portion of the cerebrum, that part of the man at once loses all power of action; also, that if the supply of blood be taken away from any considerable portion of the upper brain, complete unconsciousness results. Led by these facts, certain physiologists invented the instrument which has been known as a *cerebrometer*. This consists of a glass tube, ending below in an expansion or hemispherical bulb, whose bottom is cut off. Over the ground edges of this is secured a piece of flexible sheet-rubber or membrane. A round opening having been made in the skull of the animal, the bulb is fitted tightly, so that the membrane rests upon the brain. Mercury is then poured into the upper open end of the tube, until it fills the bulb and reaches to a certain height in the tube. It is evident that when the brain contains little blood, and the pressure inside of the skull is small, the mercury will be low in the tube, and that when a rush of blood into the brain raises the pressure, the mercury will be forced up the tube. By means of the cerebrometer it has been shown that during sleep there is little blood in the brain, whilst during the waking moments the pressure rises. These facts do not, however, prove the truth of the theory. It is perfectly possible that the lessened flow of blood is due to the sleep, and not the sleep to the lessened flow of blood. When any organ is in active exercise there is, as already stated, a flow of blood to it. When a salivary gland secretes spittle, it fills with

blood; but it is abundantly proven that the flow of blood is not the cause of the secretion, but the secreting impulse the cause of the flow of blood. So, probably, is it with the brain; the awaking out of sleep brings blood to its active protoplasm, and when the latter becomes quiescent, the vital fluid no longer needed inside of the skull seeks other quarters.

Unconsciousness can undoubtedly be produced by a great excess of blood in the brain, and, as already shown, the line between sleep and coma is not a clear one. The anæmia theory of sleep is certainly not as yet demonstrated, and to me it seems improbable. The simplest and most probable explanation of sleep-production seems to be, that the highest brain protoplasm is so constructed that at certain times it rests from active exercise, because it has exhausted its energy, and that the impulse to sleep is from within, not from without, the nerve-centres. The law of habit, which was discussed in the earlier part of this book, has, in all probability, much to do with the production of sleep. A brain may not really have done much work, but composes itself to sleep at a certain time in the twenty-four hours, because such has been its habit for many years.

Whatever may be the correct theory of sleep, I think observation has clearly shown that, for sleep to be perfectly obtained, the following accessories are required: — First, the power of shutting off the imme-

diate past, and breaking away from the work the mind has been most intently engaged upon during the day. Second, the power of locally regulating the supply of blood in the brain, so that it shall be adapted to the wants of the brain, and be neither too much nor too little for the needs of the moment.

When the regulation of the blood supply is seriously deranged, the doctor should be seen at once. To discuss in detail such a medical point is beyond the scope of the present volume. It is only necessary to say that by exercise, proper living, and all other methods which are described in works on general hygiene, the brain-worker must endeavor to keep up the general health, and prevent any disturbance of the circulation.

So far as the voluntary acts of the individual are concerned, "going to sleep" is usually simply a shutting out both of the past and of the outer world of the present. The methods of doing this are various — some direct, some indirect. By a stern effort of the will, some people seem able to quiet the attention. It is largely by possession of this power that these individuals are able to go to sleep whenever they desire. More mysterious than this, although in some way related to it, is the power which various individuals have of waking out of sleep at a time upon which they have previously determined.

Counting numbers backwards, imagining some

pleasant but not exciting "castle in the air," even the physical acts of getting quiet and shutting the eyes, are simply useful as indirect aids in lulling the attention, by shutting out all disturbances which shall excite it.

With a clear idea as to what it is desired to do, those who do not go to sleep easily are much more apt to hit upon some effective device. With some a short period of cheerful converse, with others a religious meditation, or the calmative effect of a cigar, or a chapter or two out of a light book, or a meditative glass of ale and its companion crackers, or even, as I have known of, a cold bath, answer the desired end of breaking off the thread of the day's work and excitement. Beyond such simple expedients as these, it is not well to go without medical advice.

A vital question, which must offer itself for solution to every brain-worker, is, how much sleep must I take, and when shall I take it? In a previous chapter, the opinion has already been expressed that the time is not a matter of much moment, provided that enough of sleep is taken with regularity. If a part of the night's sleep is replaced by an afternoon nap, well and good; provided that the nap be taken systematically and not intermittently. There is no real objection to sitting up late at night or to getting up early in the morning, provided sufficient time for

sleep is allowed. It is of little importance in the life history of a candle at which end you begin to burn it; but to burn both ends simultaneously is soon to finish the candle. If you go to bed late, don't get up early.

In the amount of sleep required, individuality counts for a good deal, but not for so much as many persons claim. There may have been men born since the creation with heads under their arms, but I have never seen one. There may have been men who could work hard and continuously on four or five hours' daily sleep, but it has never been my lot to know one. I have watched a number of individuals who affirmed that five or six hours were sufficient for them, and have been convinced that, in a few of these cases, the amount named was really all that was taken; but have in every instance seen the individual, by some form of breakdown, suffer the penalty of having endeavored to cheat Nature. There are not many men who are able to perform severe mental work year after year, without suffering, on less than an actual daily sleep of seven hours. Any who, except in advanced years, can get along with less than six hours is a *lusus naturæ;* and there are many who require more than seven hours. This rule is especially modified by two factors, whose importance is not always recognized — the first of these is age; the second, work. The child who

is using his brain at school should have all the sleep he will take; less than nine hours is not rarely a scanty allowance. The grown youth or the middle-aged man require less sleep than does the child. It is to them that the rule just enunciated especially applies. As middle life is passed, the daily need of sleep is lessened. A man at sixty usually requires less rest than he did at thirty-five. Why this is so is not altogether clear. It is possibly because a man at sixty usually works less than he does at forty. Even if he accomplished the same results, by long habit the work has become easier and without effort. It is quite possible, that if a man at sixty engage in a new kind of labor, his sleep-needs will equal those of the younger man. As old age draws on, there is a steady increase in the sleep requirements, until finally nine, ten, or twelve hours daily are well passed in forgetfulness.

Every one recognizes that severe physical work must be followed by a corresponding rest; but it is not so universally remembered that the one law rules mental and physical labor. When a man works hard with his brain, he must rest hard not only in recreation, but also in sleep. If a personal allusion may be pardoned as an illustration, I have found that, when using my brain vigorously, about one hour more of sleep was required daily than when, for a number of successive days, no effort was put forth.

CHAPTER VII.

CONCLUSION.

THERE are one or two still untouched subjects upon which it seems right to say a few words before closing this brief essay. In the lives of most men who struggle upwards, there come periods when it is necessary to perform a great deal of labor in a short time. If the object to be gained is sufficiently important, it is perfectly justifiable to take a certain amount of risk of suffering from overwork. The risk is, however, comparatively slight, if the principle of a compensating rest after the exertion be borne in mind. Acute brain exhaustion following a spell of work is an entirely different condition from the breakdown which results from a long-continued strain. In the acute attack, the brain almost invariably recovers itself entirely in a comparatively short time. There is, however, great danger in a too frequent repetition of this spendthrift process of paroxysmal labor.

When a large production is necessary in a short time, it is important to reduce the strain to the lowest degree possible by attention to the various principles

already discussed in this Primer. In most cases, exercise is for the time being to be neglected; but only under the most extraordinary circumstances is it wise to curtail the amount of sleep.

The question as to the use of stimulants always presses itself to the man jaded with overwork. They are, if possible, to be avoided, or, at most, to be used with the greatest caution. Tobacco, though it sometimes seems to soothe, is a most dangerous friend, and its free use during a spell of hard work is very apt to increase sensibly the peril. Alcoholic stimulants are likewise dangerous allies, which should be treated with the atmost caution. In some persons they do aid in mental effort, but any use for such purpose is but too apt to lead to dependence upon them, with its resultant progressive demoralization. To lawyers overwrought by the exigencies of a great trial, they are especially attractive, because there is at such times a distinct physical as well as mental basis of exhaustion. In the case of generals during a hard campaign, the temptation is even more urgent. Indeed, it may be stated as a general principle, that the more the brain-work is performed under circumstances of excitement and bodily fatigue, the more forcibly does alcohol present itself. It should, however, never be forgotten that alcoholic stimulants do not give real power, and that when taken they should be so along with food. A dish of raw oysters, with a bumper of claret or

a glass of ale, may afford the often-needed sustenance during the labor of a protracted speech, or of an exciting political or military contest. It seems to me very important to the advocate that he should never spend many hours in court without light but sustaining food. Indeed, it should always be a guiding principle, when physical labor and mental labor go hand in hand, always to take simple food at not too long intervals. I certainly have seen injury from the habit of going from breakfast to a late dinner without food, or only with a very light lunch.

Tea or coffee is to many, if not to the majority of persons, a better stimulant to mental effort than alcohol, and certainly far safer. The abuse of them is very much less perilous than is that of whiskey or brandy, but it certainly does increase the penalty to be paid for the excess of labor. Coffee is perhaps more apt to produce unpleasant symptoms than is tea, though individual peculiarities here play an important part.

Both to the paroxysmal and steady brain-worker it is important to be able to perceive the indications of the coming storm, and so avert evil. The forewarnings of nervous breakdown are sometimes very plain, and sometimes so obscure, as to be read only by the most skilful physician. To discuss them at all satisfactorily, would carry one far beyond the bounds and

scope of this Primer; all that can be done is simply to outline a few of the more important.

Excessive nervousness, or irritability, as every unfortunate wife of a hard driven brain-worker well knows, is a very common result of overwork. Its meaning is that the over-taxed nervous system is so exhausted that the least discord or unnecessary effort is painful to it. It is often preservative of health, because it becomes so annoying to the man himself as to drive him to rest. What pain is to the broken limb, such is nervous irritability to the exhausted brain; by suffering, it forces the worker to let his nervous system rest. It rarely presages those serious disasters which come suddenly after a prolonged strain lasting for years. The dangerous brain condition is that in which the cerebrum has become so benumbed as not to feel the peril, and demand a halt.

Headache is another of those fortunate symptoms which are of a character to make themselves so felt as to force the attention of the brain-worker. The head is often the seat of unpleasant sensations which are not headache, but which, as the signs of mental over-driving, are of even more serious meaning than is headache. Such are a sense of weight on the top of the head, a feeling of constriction of the forehead, or a more general cephalic distress. Such phenomena, occurring after long-continued strain, are very significant, and should always be heeded.

Sleeplessness is a very common indication of overwork, which, when pronounced, demands medical advice. Of still more importance are the following manifestations, and the only counsel I can give those who suffer from them is, to lose no time in trifling, but to seek at once the best medical attention. Such are numbness in one or more of the extremities, permanent slight loss of control over some groups of muscles, momentary loss of consciousness, failure of memory, or loss of the power of fixing the attention. In some cases the forewarnings consist simply of momentary losses of power in the arms or legs.

THE END.

INDEX.

Price

SYLVIA'S
NEW NEEDLEWORK BOOKS.

Crown 8vo, fancy boards, profusely Illustrated, price *1s.* each.

1/- 1 **The Child's Illustrated Fancy Work and Doll Book.** Containing Suggestions and Instructions upon the Making of Dolls' Furniture, Dresses, and Miscellaneous Articles, suitable for Presents. Illustrated.

2 **Sylvia's Lady's Illustrated Lace Book.** A Collection of New Designs in Point Lace, Renaissance Work, Guipure, and Punto Tirato. Illustrated.

3 **Sylvia's Book of Ornamental Needlework.** Containing Illustrations of various New Designs, with full Instructions for working.

4 **Sylvia's Illustrated Macrame Lace Book.** Containing Illustrations of many New and Original Designs, with complete Instructions for working, choice of Materials, and suggestions for their adaptation.

10/6 **ART NEEDLEWORK.** A Complete Manual of Embroidery in Silks and Crewels. With full Instructions as to Stitches, Materials, and Implements. Demy 4to, cloth gilt, *10s. 6d.* With many Designs in the Text, and **Four valuable Folding Supplements.** *A most useful and handsome Presentation Volume for Ladies.*

5/- **THE LADY'S BAZAAR AND FANCY FAIR BOOK.** Containing Suggestions upon the Getting-up of Bazaars, and Instructions for making Articles of Embroidery, Crochet, Knitting, Netting, Tatting, &c. With 364 Illustrations. Crown 8vo, cloth gilt, gilt edges, price *5s.*

5/- **THE LADY'S HANDBOOK OF FANCY NEEDLEWORK.** Containing several hundred New Designs in Ornamental Needlework, Lace of various kinds, &c. With full Instructions as to working. Crown 8vo, cloth gilt, gilt edges, price *5s.*

THE LADY'S

BAZAAR AND FANCY-FAIR BOOKS.

Crown 8vo, fancy wrapper, price *1s.* each.

1/- 1 **Sylvia's Book of Bazaars and Fancy-Fairs.** How to Organise a Bazaar or Fancy-Fair, and arrange for Contributions of Work, Fitting up the Stalls, suitable Dress, Organisation of Lotteries and Raffles. With 75 Illustrations.

2 **Sylvia's Book of New Designs in Knitting, Netting,** and Crochet. Arranged with special reference to Articles Saleable at Bazaars and Fancy Fairs. With 107 Illustrations.

3 **Sylvia's Illustrated Embroidery Book.** Arranged with special reference to Bazaars and Fancy Fairs. Coloured Embroidery, White Embroidery. With 139 Illustrations.

4 **Sylvia's Illustrated Book of Artistic Knicknacks,** Articles suitable for Sale at Bazaars and Fancy Fairs. Every variety of Decoration for the House and the Person, with minute Instructions for Making. With 36 Illustrations.

Price

BEETON'S
NATIONAL REFERENCE BOOKS.

Strongly bound in cloth, price *One Shilling* each
*(Those marked thus * can be had cloth gilt, price 1s. 6d.)*

1/- *1 **Beeton's British Gazetteer:** A Topographical and Historical Guide to the United Kingdom.

2 **Beeton's British Biography:** From the Earliest Times to the Accession of George III.

3 **Beeton's Modern Men and Women:** A British Biography, from the Accession of George III.

*4 **Beeton's Bible Dictionary:** A Cyclopædia of the Geography, Biography, Narratives, and Truths of Scripture.

*5 **Beeton's Classical Dictionary:** A Cyclopædia of Greek and Roman Biography, Geography, Mythology, &c.

*6 **Beeton's Medical Dictionary:** A Guide to the Symptoms and Treatment of all Ailments, Illnesses, and Diseases.

7 **Beeton's Date Book:** A British Chronology.

8 **Beeton's Dictionary of Commerce.** Containing Explanations of the Terms used in, and modes of transacting Business.

9 **Beeton's Modern European Celebrities:** A Biography of Continental Men and Women of Note.

5/- **Tegg's Readiest Wages Reckoner.** Fcap. folio, cloth, *5s.*

3/6 **Profit and Discount Tables.** For the use of Traders in their Purchases, Sales, and taking Stock. Demy 8vo, cloth, *3s. 6d.*

2/6 **Beeton's Counting House Book:** A Dictionary of Commerce and Ready Reckoner combined. Post 8vo, cloth, price *2s. 6d.*

1/6 **Showell's Tradesmen's Calculator.** New Edition, *1s. 6d.*

SIXPENNY MANUALS.

Neatly and strongly bound, *6d.* each.

6d.

1 **Beeton's Complete Letter Writer for Ladies.**
2 **Beeton's Complete Letter Writer for Gentlemen.**
3 **The Language of Flowers.** Profusely Illustrated.
4 **The Poetry of Flowers.** Profusely Illustrated.
5 **Webster's Ready Reckoner.** 256 pages.
7 **Webster's Pocket Dictionary** of the English Language.
8 **New Letter-Writer for Lovers**
9 **Practical Cookery and Economical Recipes.**
10 **Cottage Cookery Book:** Handbook for Young Housewives.
11 **Beeton's Sixpenny Wash[illegible]ng Book.** For 26 Weeks.
12 **Don't:** A Manual of M[illegible]akes and Improprieties.
13 **Common Blunders in Writing.** *Uniform with* "DON'T."
14 **Common Blunders in Speaking.** *Uniform with* "DON'T."
15 **Stop!** A Handy Monitor and Pocket Conscience. *Uniform with* "DON'T."
17 **Discriminate!** *A Companion to* "DON'T."
18 **English as she is Wrote.** *Uniform with* "DON'T."
19 **Ingglish az she iz Spelt.** *Uniform with* "DON'T."

Price

WARD, LOCK AND CO.'S UNIVERSAL SERIES OF

SHILLING USEFUL BOOKS.

1/-

1 Beeton's Shilling Cookery Book. With Cold. Plates.
2 Beeton's Shilling Gardening Book. Fully Illustrated.
3 Beeton's Complete Letter Writer, for Ladies and Gentlemen.
4 Webster's Pocket Dictionary of the English Language.
5 Beeton's Ready Reckoner. With many New Tables.
6 Beeton's Pictorial Spelling Book. With many Illustrations.
7 Beeton's Family Washing Book. For Fifty-two Weeks.
9 Beeton's Investing Money with Safety and Profit.
13 Webster's Book-keeping. Embracing Single and Double Entry.
14 The People's Housekeeper: Health, Cookery, Clothes, &c., &c.
15 Ward and Lock's Pocket English Dictionary.
16 Ward and Lock's English and German Dictionary.
18 Complete Etiquette for Ladies.
19 Complete Etiquette for Gentlemen.
20 Complete Etiquette for Families.
21 Mrs. Warren's Economical Cookery Book. Illust.
22 The Etiquette of Modern Society.
23 Guide to the Stock Exchange. Revised Edition.
24 Tegg's Readiest Reckoner ever Invented.
25 The Bible Student's Handbook.
28 Speeches and Toasts: How to Make and Propose them.
29 Ward and Lock's New Pronouncing Dictionary.
30 Grammar Made Easy: The Child's Home Lesson Book.
31 Child's First Book of Natural History. Illustrated.
32 Webster's Dictionary of Quotations. With full Index.
33 The Pocket Map of London, and 32,000 Cab Fares.
34 Beeton's Recipe Book. Uniform with Beeton's Cookery.
36 Walker and Webster's Dictionary of the English Language.
37 Holiday Trips Round London. Profusely Illustrated.
38 The Holiday Companion, and Tourist's Guide.
39 Ward and Lock's Indestructible A B C. Illustrated.
40 Doubts, Difficulties, and Doctrines. By Dr. Mortimer Granville.
41 Beeton's Dictionary of Natural History. Illustrated.
42 The Dictionary of Every-day Difficulties.
43 Webster's Illustrated Spelling Book.
44 Beeton's Book of Songs. New and Improved Edition.
45 The Human Body: Its Structure, Functions, and Design.
47 M'Phun's Universal Gazetteer. Pocket size.

Price

WARD AND LOCK'S

LONG LIFE SERIES.

Accurately Written and Carefully Edited by Distinguished Members of the Medical Profession.

Price *1s.* per Volume, neatly bound in cloth.

1/-

1 Long Life, and How to Reach It.
2 The Throat and the Voice.
3 Eyesight, and How to Care for It.
4 The Mouth and the Teeth.
5 The Skin in Health and Disease.
6 Brain Work and Overwork.
7 Sick Nursing: A Handbook for all who have to do with Cases of Disease and Convalescence.
8 The Young Wife's Advice Book: A Guide for Mothers on Health and Self-Management.
9 Sleep: How to Obtain It.
10 Hearing, and How to Keep It.
11 Sea Air and Sea Bathing.
12 Health in Schools and Workshops.

THE SATURDAY REVIEW says: *"It is not too much to say of them, as a series, that the shilling invested betimes in each of them may be the means of saving many a guinea."*

BEETON'S LEGAL HANDBOOKS.

Crown 8vo, in strong linen boards, price *1s.* each.

1/-

1 Property.—2 Women, Children, and Registration.—3 Divorce and Matrimonial Causes.—4 Wills, Executors, and Trustees.—5 Transactions in Trade, Securities, and Sureties.—6 Partnership and Joint-Stock Companies.—7 Landlord and Tenant, Lodgers, Rates and Taxes.—8 Masters, Apprentices, Servants, and Working Contracts.—9 Auctions, Valuations, Agency, Games and Wagers.—10 Compositions, Liquidations, and Bankruptcy.—11 Conveyance, Travellers, and Innkeepers.—12 Powers, Agreements, Deeds, and Arbitrations.—13 The County Courts.—14 The Householder's Law Book.—15 The Licensing Laws.—16 The Married Women's Property Act, 1882.—17 The Bankruptcy Act, 1883.—18 The New Reform Act.

WARD AND LOCK'S

EDUCATIONAL SERIES.

Fcap. 8vo, neat cloth, price *1s.* each.

1/-

1 Cobbett's English Grammar. New Annotated Edition.
2 How to Pass Examinations; or, The Candidate's Guide to the Army, Navy, Civil Service, &c.
3 Cobbett's French Grammar. New Annotated Edition.
4 The Shilling Self-Instructor; or, Every Man his Own Schoolmaster. Illustrated.
5 Professions and Occupations: A Guide for Young Men to the Army, Navy, Civil Service, &c.
6 Common Blunders in Speaking and Writing, and How to Avoid Them.