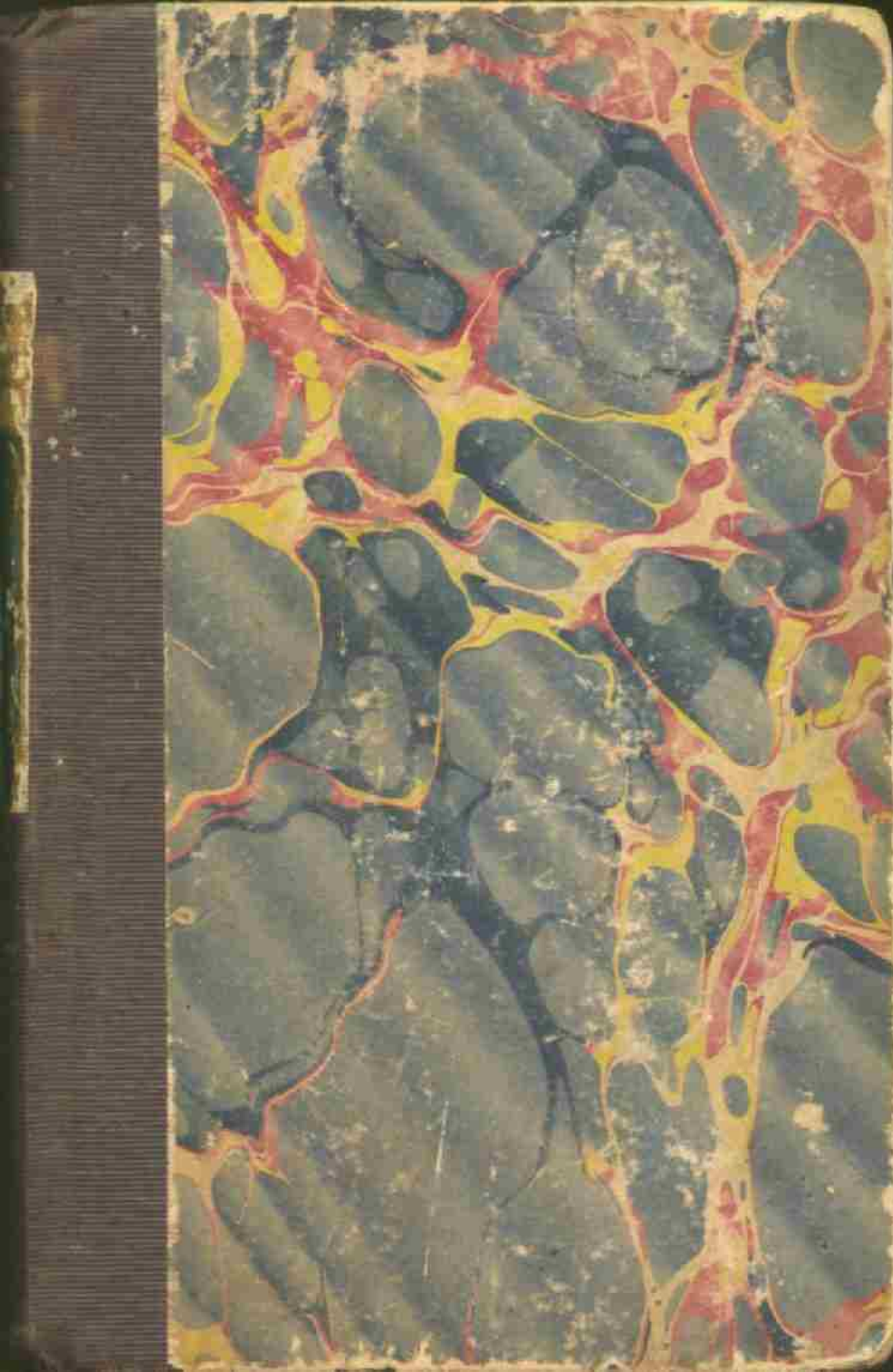

MAN,

IN HIS

PHYSICAL, INTELLECTUAL, SOCIAL,

AND

MORAL RELATIONS.

BY W. NEWNHAM, ESQ.

"KNOW THYSELF."

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MAN

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PHYSICAL, INTELLECTUAL, SOCIAL, AND MORAL RELATIONS.

INTRODUCTION.

Before inviting the attention of my readers to the following pages, it has forcibly occurred to me, that it might be desirable to fix their minds a little upon the uses and abuses of the pursuit of knowledge;—and while encouraging them to zeal and activity in that pursuit, to point out also the dangers with which it is surrounded, and the errors which they should be careful to avoid.

It would seem almost superfluous to say one word on the subject of *education*:—since at the present day it seems to be a settled judgment, that man *should* be educated,—and the only question left for consideration is the extent to which that education should be carried. This would form far too large a subject for

discussion in a preface; and even its general features can only be touched upon, in connexion with the single object before me; and particularly with regard to one inseparable attribute of education, which is too generally lost sight of, namely, *its progressiveness.*

It is true, that this attribute is, to a certain extent, practically remembered; and the child is taught the first rudiments of written language before it is invited to attend to higher branches of knowledge; therefore its education is essentially progressive up to the period of its leaving school, or of its having acquired such an amount of knowledge as shall enable it to pass through life in the position in which it has been placed by Providence. Here, however, education too generally terminates; and this is the error which I wish to signalize, as the main ground on which I would recommend the pursuit of knowledge.

The simple term Education, means, to draw out, or to develop the mental powers and faculties; but the very practice of education has been to develop those powers up to a certain period; and that period so calculated as to confer generally only such an amount of knowledge as shall be barely sufficient to enable its

possessor to pass current among his compeers, as just adequate to the necessities of his situation. Thus the boy leaves school, with such an amount of knowledge as shall enable him to get through his apprenticeship with credit ; and his apprenticeship with such an amount of increased knowledge as shall fit him to procure the means of subsistence. So also with regard to the professions:—in every instance, the amount of knowledge required to pass through preliminary ordeals, is the minimum of that which shall be sufficient to enable its possessor to pass through life, and to obtain his own livelihood. But what is there that should define a period at which an essentially progressive process should be arrested? What is there which should fix this limit to the development of the powers of the human mind? What reason can be given for contentment with the minimum of knowledge, and what reason exists why this object should not be exchanged, for the maximum of attainable information, always, however, with reference to the position in which man is placed —both as to his class, and his individual peculiarities? For it is a clear and fundamental law of Omniscience, that each one of his creatures is fitted for the position he has

appointed it to fill; and we are not to contravene that law. On the contrary, we are called upon to accept it with gratitude, and to calculate upon it, all our plans of development. Still it is equally manifest, that there is another law of Omniscience, by which it is fixed, that the education of his finest work, man, should be progressive—that it should not be fixed by any arbitrary conventionalities, but that from the cradle to the grave, his powers should be developing—first, for the purpose of augmenting his own energies; next, to increase his usefulness to his fellow-man; thirdly, to show forth the glory of His name; and lastly, to fit him for that eternity of blissful enjoyment, which we can only realize in the fullest amount of knowledge, the fullest development of benevolent feeling, the entire absence of all inferior or sinful motive, and the fullest devotion and obedience to the Most High.

If so, it follows, that education must be progressive; and that it becomes the duty of every man, when he has escaped the trammels of scholastic preparation, to begin the work of self-education, and to carry it on to its highest attainable point, always keeping in view the augmentation of his own power of usefulness to

his fellow-man, and the consecration of these powers to God who bestowed them. These two objects must never be dissociated; for if either be forgotten, it follows, that man's intellectual powers are chained to the earth and its productions, forgetful of his high original, and higher destiny; or, that he passes his days in ascetic abstraction from his fellow-man, dwelling in dreary contemplation, and unmindful of the great duties he is called upon to perform.

The principle being thus established, there arises the corollary, that it is as much a positive duty in every man to educate or cultivate his own intellectual powers, as it is to worship God, because the apparent two ideas are actually one—since in improving his own talents justly, he worships Him who gave them—and he cannot acceptably worship God, without cultivating those talents to the utmost: this, of course, presupposes their proper direction, and will be the subject of some further observations.

There is not frequently to be found, a more interesting spectacle than that of a young person's first devotion to real study—the many interesting associations which are before him; the good resolutions of untiring diligence with which he girds himself up to his work; the

zeal and energy with which he devotes his spare hours to the subjects of deepest interest and expectation before him; while youth, activity, and the earnest desire of acquiring knowledge, are his propitious aids and advocates;—when the evil of misspent time, never to be redeemed, forces itself upon the sickening heart, and produces a conviction of the necessity of not allowing to pass unheeded the present—perhaps the only—opportunity of pursuing knowledge for its own sake;—and the resulting determination not to permit its escape unimproved. Such have been my own feelings, in days yet dear to memory's sacred page; such probably, at this moment, are the feelings and sentiments pervading the mind of my reader.

Nor would I repress these feelings, for they originate in a high estimate of the value of time—of that talent which is only entrusted to us for a season, and we know not for how short a season; of that time which is far too short for the full development and expansion of the human mind; of that time, the improvement of which is limited by a thousand circumstances; of that time, in which alone we can prove our desire to serve God acceptably; for the right employment of every second of which

we are minutely accountable; in which our eternal destiny is fixed; and which should be spent in preparation for eternity.

As human beings, we discover ourselves capable of reasoning beyond the actual and the present; our knowledge is not confined to the mere images of sense; and we feel competent to give evidence of our high and distinct character in the animal creation; for in no other class of animals can be found the evidence of the improvement of their faculties. While others of God's creatures are observed to yield obedience to instinct, imitation, and bodily appetite, man alone is endowed with reason and conscience—with power to carry his thoughts forward to the future, and backward to the past, and to draw inferences for the regulation of his conduct towards himself, towards his fellow-man, and towards *Him* from whom he has derived every blessing, and to whose service he is bound to consecrate every talent. Thus, while the attributes of mind and reason place man in the dominant position which he holds in the universe, the moral and religious feelings of which his nature is capable, would seem to inculcate and require a corresponding elevation of his thoughts and actions.

It is beyond the power of finite capacity to limit the extent of human science, or to say, Thus far *shalt* thou go—or *canst* thou go—and no farther. Man's spirit bursts the chains thus forged for its repression; and, redeemed from the thraldom of slavery, proudly defies its oppressors, throws aside its manacles, and asserts that it *can*, and that it *will*, go farther. Vain and fruitless would be the attempt to annihilate the aspirations of youthful intelligence and conscious power; or to enslave the existing generation within the circle of knowledge acquired by their forefathers. Every sign of the times marks progress, and shows that we are rapidly hastening on to some great re-constitution of society, upon which we cannot now expatiate.

Yet it is manifest, that this bustling pursuit of knowledge, this restless and indomitable activity of the intellect, requires direction, care, and guidance; for the tree of knowledge bears upon its branches both fruit of good and evil; perhaps equally inviting to the senses and tempting to the inexperienced. Hence the necessity for profiting by the experience of others, and for some certain and definite rules, by following which, the good may be obtained, and the evil rejected.

But the young will soon fancy that they themselves have already become experienced, and, therefore, it is necessary to remark on the nature of experience, that it does not consist in *seeing much*, but in *seeing well*; that it does not consist in the apparent results of ill-investigated phenomena, but in the formation of legitimate inferences and fair deductions, from a sufficient number of well-observed facts. Here again the aid of mature judgment is most important to direct the inquirer.

Whatever may be the future destiny of social man, it is an incontrovertible fact, that knowledge is still in its infancy. Gigantic though its strides may have been, its acquisitions have only given power to that reason, which is to form the means of its future extension;—and who can venture to limit the powers of that faculty, which has been specially and mercifully conferred upon man, by Him who created him in His own image, and conferred upon him talents, which, for aught we know, may, when disencumbered of the body, be illimitable. While thus we thankfully adore the infinite goodness and mercy of the Giver, let us humbly seek to dedicate ourselves to his service: and, in all the pursuits of knowledge, to remember,

that they are all subordinate to the first great object of our creation — the glory of God and the good of our fellow-creatures.

Sprung from this high original, man's spirit cannot crawl upon the surface of this dull world; it travels with the light of heaven into infinite space, and calculates on a life, and a capacity commensurate with its desires; for he cannot believe that the wondrous facts of creation teach him to look for the end of life only in the death of his body; but he feels that, in proportion as his intellect extends and expatiates in knowledge, so does it expand to immortality; and when most intimate with the realities of time, his reason finds stability, satisfaction, and rest, only in the prospect of immortality, and in communion with the Infinite.

This position regards man as designed to be instructed by an acquaintance with good and evil in this world, in order that his will may be disciplined and subjected to moral government, and taught to resist and conquer physical tendencies; and that having knowledge imparted to the mind, and moral motives presented to the soul, he may be the better qualified for all the relations of social and intellectual life, and for

his final introduction to an enlarged sphere of perfect and endless existence.

Let it be remembered that, however excellent and highly gifted may be the development of man's brain; however largely may preponderate the intellectual over the more purely animal organization, still he will be incapable of exercising these faculties to good purpose, unless he has been accustomed to their control by the influence of moral motives. The brain does not yield a ready obedience to the demands of reason, but by slow degrees; and is only brought into a state suitable for the proper manifestation of our faculties, by reiterated impression. In fact, the brain is not fully developed as the organ of intelligence, unless the mind has been regularly educated and drawn out by appropriate employment during the period of its growth. We have already stated, that appropriate employment consists in the acquisition and use of all such knowledge as will enable its possessor most thoroughly to perform his duties towards God and towards man, in the position of life in which it has pleased an all-wise and gracious Providence to place him. We think this principle so important, that we do not hesitate to repeat it: a man

is not improved by his increased stores of knowledge, but by his accumulation of available knowledge—of such as will make him a wiser, a happier, a more useful, and a better man. It is useless here to quote examples of great men who have struggled into eminence through all the difficulties of their early position, and have made a standing fit for themselves among the wise, and good, and great. Such instances are rare; they form exceptions to the general rule; they are unattainable to the many, and are only examples for imitation in their untiring industry and exhaustless perseverance. And, after all, such men are only examples of one general rule,—of those who, through many obstacles, have reached, *apparently* by their own efforts, a situation for which they have been previously fitted by the good gifts of God. Every man is not born a Newton, or a Telford; but every man is born with an amount of industrial power, with which he is bound to improve the talents given him to the utmost, by their intense devotion to the objects before him. But this requires the employment of the *will*, in directing the attention to the pursuit of knowledge; to reflection upon the stores already acquired; to association and combina-

tion of the whole; and, by this occupation of the will upon attention, memory, and association, actually to produce such an augmentation of the power in the brain, as to render it better adapted for higher and deeper objects of inquiry,—up to a certain point fixed by the laws of its healthy function, or until disease or decay supervene. And who shall venture to define the nature of this limit, when all our knowledge of its power leads us to a point beyond which we cannot see by the aid of ordinary vision, but from the dim, and shadowy, and undefined outline before us, we are led to believe there exists a region of illimitable knowledge, suited to the human mind when disencumbered of its material fabric, and material hindrance to advancement. We may just remark in passing, that—so far from mind and memory resulting from the brain—brain in its relation to mind, is actually developed and regulated in subserviency to the will: and that, however good may be the natural conformation of a child's brain, that child must grow up deficient in intellectual power, if his will be not called into operation, by the agency of moral motives.

Perhaps I have detained you too long on the

necessity of the progressive education of the mind of man; but it appeared necessary to place before you, in a strong light, the indispensable importance of this cultivation; the limits pointed out by nature and Providence; and the general objects which should be steadily kept in view, as preliminary to any discussion upon the uses and abuses of the pursuit of knowledge.

Had my limits permitted, I might have invited your attention to the advantages arising from the abstraction of man from the pursuit of animal gratification; from the development of his intellectual power; from the cultivation of his moral faculties; from the materials for thought thus afforded, during the hours devoted to mechanical pursuits; from the augmented power of exercising the right of private judgment; from the development of an increased capacity of reasoning; from increasing the power and the habit of self-government; from enlarging the sphere of charity towards others less highly gifted; from producing a high estimate of, and value for, those more deeply learned than ourselves; from fostering a deep feeling of humility, when comparing the extent of your actual knowledge with that which is

required to be known ; from naturally creating intellectual industry, or the desire after more knowledge ; from encouraging a principle of obedience to mental or providential superiority ; and from explaining, and recommending, and enforcing the great truths of religion, and leading the mind, convinced of its own helplessness, to the Bible as the only foundation for solid peace, or moral worth.

I should have pointed out to you, had there been opportunity, the dangers with which a n abuse of this pursuit was encompassed ; I shoul l have warned you against the pursuit of knowledge for its *own* sake ; against the idolatry of intellect ; against the mischievous tendency of immoral works ; against the influence of all writings which would cherish the animal passions, and foster the organic suggestions of the human machinery ; against an unbecoming confidence in your own opinion ; against the misapplication of the powers of reasoning to make the worse appear the better part, and to all the miserable intricacies and perversions of sceptical sophistry ; against the danger of augmenting, by the refinements of science, the power to do evil, and to facilitate the offshoots of depravity ; against the indulgence of a supercilious, proud feeling

towards others less highly endowed; against an inordinate estimate of your own judgment; against the growth—the insidious and malignant growth—of the pride of intellect; against the creeping approaches of indolence and contentment with present attainment because we have been formerly industrious; against the first germ of a proud self-sufficiency which looks with contempt upon just and legitimate restraint; and finally, against entertaining a light estimate of religious truth, and listening to the serpent voice of infidelity.

But my fast-closing pages only permit me to add, in conclusion, as an appropriate inference from the preceding argument, which has shown the advantages and disadvantages of the pursuit of knowledge, that the necessity for this pursuit consists in the ignorance and feebleness of man; that its liability to perversion arises from the imperfection of man's nature, and the great change which has passed upon his reasoning powers; that his unassisted helplessness has been unveiled, and his need of instruction in every part of his life and conduct; that in himself, he does not possess the means of restoration to those powers, and to that image of God in which he was created; and that from the urgency

of these considerations, it behoves you as individuals, to inquire, whether there be not some remedy for these confessed evils; whether there be not some way of restoration, beyond the narrow gauge of reason, which has been offered to the acceptance of erring man.

And here, let me commend to your private and individual study, that revelation of God's will, which he has been pleased to vouchsafe in that best of all books—by pre-eminence, THE BIBLE—that book, which, to the sincere inquirer, will be found the best guide to conduct on earth, and to happiness throughout eternity. Let me remind you, that, while it is your duty to cultivate the intellectual talent with which you have been endowed, it is your higher duty to devote your spirit to the love and service of the most high God, and to remember that you are responsible for every moment of time—for every thought and every action, to Him that judgeth righteously; that only that can be approved by him which is in obedience to his commands; and that, while the neglect of the reasoning and intelligent principle renders you deeply culpable in the eyes of Him who created nothing in vain and for nought, you will be still more deeply culpable if you set up an idol

as an object of pursuit and adoration, in the room of the living and true God. Remember that your responsibility is great in proportion to your privileges; that it is increased by every augmentation of knowledge; that from him to whom much is given, much will be required; that while wilful ignorance is a crime, abused knowledge is a crime of deeper dye; and that you can only be safe and happy here or hereafter, by cultivating your talents to the utmost, but also by subordinating them to the glory of the Giver. "In all thy ways acknowledge him, and he shall direct thy path. Wisdom is the principal thing; therefore get wisdom: and with all thy getting get understanding."

That you, my dear readers, may be thus wise unto salvation; and that the following pages may be useful in promoting this, the grand and final aim of man, is the sincere wish, and fervent prayer of

THE AUTHOR.

CHAPTER I.

Introduction—Man's Animal Position—On Life generally—Proposed Division of the Subject.

To the reflecting mind—to him who is conscious of his moral being—to him who knows himself as the highest and most perfect of God's creatures—to him who feels his responsibility as arising from the several relationships of life, and his own final accountability to the Author of his being—it cannot but be matter of grave inquiry, What am I? Why has God made me thus? What are my powers, my hopes, my duties, as arising out of my animal, social, and relative position? And if the most important study of mankind be *man*; and if to know himself be one of the highest and best attributes of God's most perfect creature, then the contemplation of my readers cannot be better directed than upon themselves, with a view to their general information, as well as to their moral benefit.

In pursuing this subject, it may be usefully

divided into the several departments of physical and organic life; of intellectual life; of social, relative, and moral life; and of spiritual life, or life in relation to eternity. The reason for this distribution is, that it would be useless to explain the perfection of man's wonderful structure, unless its uses were detailed; unless it were shown that the most perfect animal was but a mere assemblage of bones, muscles, blood-vessels, and nerves, except for his intellectual life; that his intellectual life is worthless, unless devoted to the improvement of his social life; and that his moral life is of slight comparative value, unless from its connexion with immortality.

In conducting the following little analysis of bodily and mental function, it will be endeavoured to convey a simple statement of what is believed to be nearest the truth, avoiding all those disputes which perplex and mystify almost all the phenomena of existence, and passing over all those minute points of difference, which, however agreeable in learned and critical discussion, must be ill-timed and out of place, when addressed to those general readers who may take up this little volume for the simple purpose of instruction and advantage.

The first remarkable peculiarity of man, and that which physically distinguishes him from, and renders him pre-eminent over, every other animal, is his possession of two hands, and his erect position; both of which are admirably suited to his intellectual superiority, and would be only especially adapted to a reasoning animal.

Man, however, possesses one property in common with other animals and with vegetables, which it is necessary to mention in the first place; since upon it all our subsequent facts and reasonings are grounded; and this is the *principle of life*. It is not intended to occupy our space with the various theories of life, which have hitherto been entertained by philosophers, and which, having lived their ephemeral existence, have given place to other, and newer, but perhaps not more enduring, forms of man's twilight creation; but rather to fix the attention upon some of its more obvious effects.

Life counteracts the common laws of gravity; during its continuance, the body is preserved in the upright posture: take away life, and the body instantaneously falls to the ground;—that is, falls as far as it can, or till it meets with some medium denser than itself, through which it cannot pass.

Again—Life resists the influence of mechanical power; were it not for the principle of life, it would admit of easy calculation, how great power must be brought to bear upon the body, in order to give it movement, and a certain degree of velocity:—but life being sustained, it is no longer capable of mathematical demonstration; because, though mechanical power may be applied in a given direction, it may be resisted by the will, and resisted in a degree proportioned to the energy of that will.

Thirdly—Life prevents decomposition: destroy it, and the tissues are immediately subjected to those changes which finally resolve them into their original elements; the body assumes new forms of gaseous structure, and returns to that earth from which it was originally framed; but let life be continued, and whatever changes may take place, still the integrity of the structure is retained, and a system of perpetual renewal makes up for all the decay and waste which are occasioned by other processes.

Again—Life modifies the influence of heat; this is sufficiently shown by our own power of comfortable existence during the fervid rays of the dog star, and in the middle of December's snows, even in our own temperate climate; but

it is still more strikingly exemplified by the power of accommodation of the same individual to life between the tropics, and within the arctic circle, to life where ice is unknown, and where it is ever present.

Lastly—Life effects constant changes in the body, by deposition and absorption. These are not the changes of decomposition just mentioned, but that process by which all that is useless in the system is removed, and its place supplied by the deposit of new matter, so that the vigour and energy of the constitution are perpetually renewed—and this law is a general one, not simply extending to the softer structures, but likewise comprehending even the bones, and all which may have been supposed to be the most permanent. This principle is more particularly shown in the growth of the body, by which the process of deposition exceeding that of absorption, each organ is strengthened, developed, and enlarged, and fitted for the stirring processes of adult life, during which, if the body be in a state of health, these processes are nicely balanced; till after a certain period, decay approaches, absorption is carried on more rapidly than nutrition, the tissues waste, and man slowly wends

his homeward way along the twilight of existence towards the narrow cell appointed as the resting-place for all.

Life, therefore, is defined by what it does rather than what it is; and in doing so, we only conform to a very general rule of definition, applicable to a great variety of processes of which we cannot understand the rationale. We may define thought by what it accomplishes, but in no other way; and we must be content with such an amount of knowledge, without curiously prying into mysteries which we cannot comprehend, and which nature seems to have intended should remain as mysteries unsolved.

Life, although not constituted, as it has been supposed, by the mere mechanical play of the organization, still requires to be supported by the unity of organic action; it cannot afford to be deprived of one part of its organic machinery: for only let one important function be suppressed, or one important organ be taken from the rest, and life will cease, and the whole system of organs and functions will be involved in one common destruction.

Such is the perfect harmony of these functions, and such their mutual dependence, that

it is difficult to determine upon which link of the chain to begin their history; for no one can be taken up, which is not essentially dependent upon another. If, for instance, the head be taken, because it seems to be the common centre of action, and to give laws to the rest of the organism, still the head is dependent upon a due supply of blood, and its function ceases if this supply be momentarily interrupted. If, again, the heart be taken, which is thus essential to the head, its office ceases, if its supply of nervous energy be cut off, if a due supply of blood to itself be not continued, and if the proper changes upon that blood be not effected by respiration. If the lungs be selected, then their function terminates as soon as they cease to be furnished with blood, or stimulated by the presence of pure air, or aided by muscular movements, which are again dependent upon the head and upon the spinal marrow. If the stomach be chosen as so essentially necessary to the conservation of the whole, this also is entirely dependent upon the head and the heart, as well as upon some less important organs, for the continuance of its own health: so that, from whatever point we may set out, we shall find it dependent upon some other point; and we can

select no beginning which has not had a previous beginning. For convenience' sake, therefore, and for no other reason, we shall commence our survey of life's functions by considering the process of digestion—not that this starting point is not liable to many objections, but upon the whole, we think it the least objectionable, and the best adapted for the simple development of our design.

A question may, perhaps, be raised in this place, But what is the *origin of life?* It has been supposed to consist in the mere play of our organization, by which every well-formed system *assumed* and continued its functions, when the machinery was complete. But even this mechanical explanation fails; for a perfect watch, or clock, will not go till the mainspring, or pendulum, be set in motion; and so the organic machinery of man must be set in motion; and if it must be set in motion, it cannot set itself in motion. Our researches extend not to this point: all we really know is, that life is never developed of itself, and the wisest part of the philosopher is to refer its origin to that revealed doctrine which teaches us to regard it as the gift of God; and if one of his gifts, then follows the necessity for devoting

such life in obedience to his will, and for the honour of his great name.

Life is marked by perpetual change: thus it is with vegetable life; in the seed, there are no distinctive marks of vitality; but let it be subjected to the influence of warmth and moisture in the bosom of our common parent, and it will be soon seen that the concealed life has become apparent; the tender plant has around it the means of self-nutrition, till it is capable of extraneous support, by converting other elements into itself, and then almost daily growth is perceptible, till we find the flower, and then the fruit in all the maturity of its development; and this fruit containing the materials of its own re-production, and affording the means of sustenance to myriads of beings, and indirectly to the highest organized being, man.

The same law of change is most beautifully exhibited in insect transformations, a subject on which we dare not linger; and, indeed, we can only state generally, that a similar principle is to be traced throughout animal life, up to the highest animal—man. Throwing back his origin, and the first germ of infant life, to the same hidden causes over which nature has chosen to draw a veil of impenetrable mystery.

and which are to be ascribed to the primordial laws of the Creator, we see him born the feeblest, the most helpless, and dependent of animals. Man, with all his most perfect organization, with all his powers and privileges, is, so far as regards his animal position, the least shielded from want, the most exposed to misery; a circumstance which would be unaccountable, did we not find the compensation in the possession of those reasoning powers, of that spiritual nature, which are his peculiar and exclusive attribute. His infancy and state of dependence, too, are very long: but the process of development, though slow, is sure; by degrees his growth is perfected, the various organs are matured, and he stands forth in all the pride of youth and beauty, in all the impetuosity of passion, in all the thoughtlessness of immature judgment. We next find him launched into the world; his principles tested by temptation; his judgment matured by experience; his passions subdued by trials; his thoughts ripened by action; his heart expanded by benevolence: his main desire that of being useful to others. We see him in the extended relations of life; we see him as the citizen among his neighbours; as the subject in con-

nexion with his government; as the Christian in respect to mankind, to his family, to himself, and to his God. But maturity passes; the strength of the body is impaired; one organ after another is enfeebled; and although the intellectual and affective faculties long survive the change which the physical powers have undergone, yet these too, in their turn, suffer; the heart is shrivelled and contracted, and beats with a less expansive throb; intellectual vision is clouded; what was formerly reached without an effort, now becomes difficult; and early prejudices too frequently blind the eye and prevent the access of truth. In this way, the circle of man's action is constantly diminishing, as he is approaching the last narrow home appointed for all the living.

But when the grave has closed upon the remains of mortality, we do not lose sight of man's life—he has yet other changes to undergo; and while the body is subjected to decomposition, the spirit has escaped to Him who gave it; and while it has been unclothed of the body, it has been clothed upon with immortality. We look through the narrow vista of the grave to the day of that resurrection when the body shall be raised incorruptible, and shall

receive its reward according to the good or evil which it shall have been the voluntary instrument of effecting. We can follow its changes no further than the grave, and the rest we learn from that revelation which it has pleased God to make to his rational creature—man.

We have traced the influence of ordinary life, and have supposed its natural termination in old age. But it is liable to be cut short by disease or accident; and it is held by a precarious tenure. Only deprive the body of pure air; prevent the access of fresh air to the lungs, and suspended animation is the consequence, because the blood is not properly changed and renewed; a sufficiency of highly vitalised blood to the brain is prevented; its function is soon paralysed, and the supply of nervous energy to the muscles of respiration being thus cut off, the respiratory movements cease, and in a very short time, life becomes absolutely extinct. But if, under these circumstances, artificial respiration be set up and perseveringly continued, the circulation of the blood through the lungs may be re-excited; by aërating the blood which is stagnated there, the brain may be again aroused to action, and the whole train of vital movements may be re-developed. The

same set of symptoms, and the same consequences, may be evoked by acting primarily upon the brain, as by a poisonous dose of opium: the brain will be so completely torpid as to give no notice to the respiratory muscles; they cease to act, and the patient dies. But this effect also may be prevented, by setting up artificial respiration, and by continuing it so long as that the narcotism shall have subsided, and the blood shall have been prevented from stagnating in the lungs, till the due notices being now again transmitted to the respiratory muscles, their function is resumed, and the play of organic life is restored.

CHAPTER II.

On the function of Digestion—Organ of Prehension—Mastication—Deglutition — Digestion — Properties of the Stomach—Hunger and Thirst—Diet.

We shall now proceed to the function of *digestion*. In this process there are a number of stages which we must attend to successively; as, for instance, there must be the hand to take the food, the mouth to receive it, teeth of different kinds to break down and divide it; there must be the nerves to taste, and the action of mastication in order to mix the food with the saliva; then, having been duly prepared in the mouth, the act of deglutition, or swallowing, conveys it into the stomach, where digestion, properly so called, commences, and that change is effected by which the food is converted into chyme; it is then further mixed with bile and other secretions and from this mixture, the fluid termed chyle is separated; and this so separated fluid is taken up by the absorbents

vessels, and finally conveyed by these into the mass of blood; the process of sanguification is completed, and the blood thus renewed, is distributed over the whole system, and conveyed to every distant part of the body. In its course, it contributes to the general nutrition of that body, and certain fluids are separated from it, or rather formed from it, by passing through the vessels of the glands appointed for these purposes; and having accomplished its intended agency in the constitution, all which is no longer useful, or which might be injurious to that system, is taken up, and in various ways expelled, these two latter processes being called secretion and excretion.

This rapid glance at the various transformations of food from its first introduction to the expulsion of such portions of it as are useless, has been given, in order that the reader might be better prepared to follow the slight details with regard to each process, which are about to be presented to his notice. Man's first duty is to provide for his subsistence, in order that he may live and develop his other faculties; but if, forgetting this, he lives only to eat, he is deeply guilty, because he neglects all his other duties.

1. The human hand is the organ of prehension: this, indeed, is only one of its functions, and even this may be dependent upon its being the principal organ of touch. Indeed, the human hand is so beautifully formed, its sensibility is so exquisite, its motions are so accurately governed in obedience to the presiding will, even as if it were itself the seat of that will, and not, as it is in fact, receiving its notices from a distance. The actions of the hand are so extensive, so perfect, so easy, that we really never think as to how they are performed; they are accomplished, and we know not why, and its entire perfection, its absence of embarrassment, or hesitation, in any of its movements, is that which makes us unconscious of its value; just, as in every other instance, ungrateful man knows not the value of his blessings till he has felt their loss. In the preliminary process of digestion, the hand acts as the organ for taking the food and conveying it to the mouth, in obedience to the conservative instinct, and to the thinking brain.

2. The mouth forms the next object of attention. We may first notice the nerves of taste, which are distributed to the tongue, and especially towards its tip:—they are here placed

as sentinels to warn the body of the approach of all that is disagreeable or deleterious, and form the first manifestation of that conservative instinct which is common to man and other animals. Upon them is depending the enjoyment which arises from taking food, and they are preserved in a moist state by the saliva, so as to be peculiarly sensitive, and to afford the greatest measure of enjoyment from the exercise of this sense. Appetite is not *primarily* dependent upon the nerves of taste, but upon the state of the stomach, and the wants of the constitution. Thus, when fever or other indisposition occurs in the system, the mouth becomes dry and parched, or the tongue is loaded and furred, so that the nerves are no longer equally sensitive; food has lost its taste—appetite is gone—enjoyment is gone—and all because food taken under such circumstances will be injurious. How wise the intention of nature in thus distributing the nerves of taste, so as to make that a pleasurable act upon which the supply of the wants of the animal frame depends! How grievously this wise arrangement has been abused! How this conservative instinct has actually been converted into an instrument of self-destruction! How man has reduced

himself from his high prerogative to the mere animal! How he has made the gratification of his palate the chief object of attention; has changed good for evil, and useful for injurious; has subordinated his high privileges and thrown them into the unsightly trough of an unclean animal, is not only matter of common experience, but of infinite regret! To *eat to live* should be his principle; *to live to eat* has been too frequently his practice.

We must pass over the arrangement of bones and muscles, and motor nerves, and glands, by which the mouth is completed, in order to notice the teeth. These are composed of the front, or cutting teeth; of the eye-teeth, or those which are chiefly instrumental in tearing the food; of the two-pointed teeth, or those which assist in the further division of the food, and preparing it for the molar or grinding teeth, which are for the purpose of completing the breaking down and trituration of the food. Man has in all, thirty-two teeth, which are divided into eight incisors, four eye-teeth, eight two-pointed teeth, and twelve molar-teeth. Naturalists are in the habit of looking at the teeth of animals in order to determine their habits:—thus, for instance, in the cow, the sheep, and the horse,

it will be found that the teeth are all grinding teeth, and, therefore, it is inferred that they live exclusively upon vegetable matter, or are graminivorous. In animals which live almost entirely upon flesh, it will be seen that their teeth are all of them cutting-teeth, and they do not grind their food; and of man, it will be noticed, that he is provided with teeth of all kinds, and, therefore, his food must be partly animal and partly vegetable: in fact, he is omnivorous. This is a beautiful instance of that one law which we find in nature to be an universal one, namely, that the creature has been formed exactly for the position it is destined to occupy; and is beautifully illustrative of the presence and the work of an all-wise Being:—for to suppose that animals have been formed at hazard, and that they have picked up their habits by chance, and formed them out of their necessities, is about equal to supposing that God had made large rivers wherever there were large cities, instead of seeing that man had built large cities on the borders of large rivers.

We notice, then, from this inspection of man's teeth, that he was intended to be omnivorous, and to provide for his food in other ways than carnivorous animals. Thus, if we examine his

eye-teeth, which correspond with those by which animals seize their prey, we shall observe by their form, how very inadequate they would be for this purpose, as compared with those of carnivorous animals generally. In some animals, as in fishes, there are no teeth for mastication; their teeth are only useful for the purpose of seizing their prey, which is swallowed whole. Again, the strength of the human jaw, which is confessedly very great, is far inferior to that of the carnivorous tribes: but here again, we remark a beautiful adaptation and compensation for lost power,—for the human jaw admits of a lateral movement, which is very useful in effecting the grinding down of vegetable matter, which had only been imperfectly divided by the front teeth. The importance of this grinding process can hardly be estimated too highly; for efficient mastication is indispensable to good digestion. The food, to be beneficial, must be well broken down, and well blended with the saliva, which seems necessary to aid in the final solution of that food. Everybody knows that, during the process of eating, a considerable quantity of saliva is poured into the mouth, and this flow of saliva seems to be dependent partly upon the mind and partly upon

the stomach. If a hungry man thinks of food, he finds a secretion of saliva in the mouth, or it is said, "his mouth waters:" but if at this time any vexatious or annoying events are presented to his mind—in a few moments the mouth becomes dry and parched, and appetite is gone: and this state gives way on the removal of the annoyance, or on the mind getting accustomed to the impression. But the flow of saliva is also dependent upon an associated action with the nerves of the stomach; for when the system requires supplies, and the food placed before it is appropriate, a secretion of saliva is set up, which is not present when the constitution does not require food, or when that food is indigestible or injurious.

Thus the stomach seems to be a kind of bodily conscience, and its memento, though too often disregarded, is of the highest practical value: thus it will often happen that a loathing is set up for some particular dish of indigestible food; and it will generally inform us when we have taken enough—a certain amount of distaste for the last few mouthfuls being an unerring indication that they are not required.

The power of adaptation to various diets in different parts of the world, which is possessed

by the human stomach, is a remarkable feature in the history of man: it can scarcely be accounted for by the influence of habit, and is rather to be explained on the principle of the different kinds of food required in different climates—more of animal food being necessary in the northern—more of vegetable matter in the southern regions of our globe. We cannot here draw illustrations from the comparative anatomy of man and other animals, nor trace the comparative history of man himself in different portions of this world's vast empire, because it would occupy too much space, and might lead to the confines of ingenious speculation.

When the food has been thus properly broken down and moistened, it is presented to the back of the throat and is swallowed. This process is effected by a muscular effort termed deglutition. A kind of expanded hand is situated at the back of the throat, which, stimulated by the presence of food, and without any thought or concurrence of the will, seizes it, and pushes it into the œsophagus, or gullet, which conducts it into the stomach.

Hitherto, the processes considered have been preparatory to the changes which are to be

effected in the stomach, in which organ true digestion really begins. The stomach is precisely adapted to the nature of the food the animal is destined to live upon; and it may be established as a general principle, that animal is more easily digestible than vegetable food. Consequently, in the purely carnivorous animal the stomach is of an exceeding simplicity: it is complicated in the herbivorous, and possesses a structure suitable to that slow digestion which is inevitable, when the diet is for the most part vegetable: but its adaptation to peculiar habit is nowhere so strikingly seen as in the stomach of the camel, which possesses cells, or small reservoirs for the reception of water, which the creature is only able to obtain at distant intervals, and which it possesses the power of emptying one after another as its necessities may require.

We purposely avoid all sorts of anatomical details as unsuited to general readers, and shall only state, that the stomach is furnished with a coat of muscular fibres to continue the transmission of the food, in proportion as it is elaborated; and also with a digesting surface, from which is secreted the gastric juice—the most powerful agent in dissolving the food—

and which is essential to its further assimilation. This fluid, although eminently solvent of matters submitted to its agency, has no influence upon living structures, or it would act upon the surface of the stomach. As soon as life is extinct, it is capable of so acting, and large holes made by the surface being thus dissolved, have been found in the stomach, which, by careless observers, have been attributed to inflammation, or to poison, before it had been ascertained to be a simple phenomenon arising from the dead tissues being unable to resist its solvent power. This power has been sometimes marked in an extraordinary way, as, for instance, in the sailor who was accustomed to swallow knives, and after whose death, knives were found in his stomach, with the handles entirely dissolved, and the blades acted upon very considerably.

The human stomach has no power of digesting *fluids*. This is a remarkable fact; but in order to secure good digestion, it is absolutely necessary that the food presented to its surface should be of the consistency of batter; and it is quite certain, that persons may be fed and almost starved, on the most nutritious fluids, provided there be no solid admixture. This may arise from several causes. First, no

mastication having been required, there will not have been a due admixture of saliva: next, there is nothing for the gastric juice to dissolve or amalgamate with: thirdly, the stomach's office is digestion, not absorption; and so, the fluid is passed on unacted upon, and is afterwards presented in a condition not suited to the remaining parts of the complete process. There may be another reason for this want of digestion, namely, that persons living upon fluids are apt to take too large quantities, and to produce distress and annoyance from their mere bulk. The inference to be drawn from this fact is, to avoid the large quantities of fluid with which the stomach is too frequently drenched; for injury is occasioned to that organ by distension, whether from simple water, or tea, or coffee, or beer, or any other alcoholic fluid. It may, perhaps, be objected that this theory must be wrong, since nature has provided a fluid for the support of the young and feeble, *even milk*. But to this it is replied, that this supply of food is only temporary, till the infant is provided with teeth; and moreover, that it affords the strongest confirmation of the principal position, since nature, in order to obviate the evil, has given to the human stomach, the power of

coagulating milk, by means of which, if the organ be healthy, it ceases instantaneously to be fluid.

Another very remarkable property of the stomach is its choice and separation of food; for it appears possessed of an intuitive instinct, by which it selects the useful, and has the power of rejecting the useless or mischievous. To such an extent does this power exist, that offending materials will be chosen from the mass in the stomach, and alone discharged by the natural effort of vomiting, while the other portions of the food will be retained and digested.

It is necessary to make a distinction between digestion and putrefaction; the former process goes on in the stomach, under the agency of heat, and moisture, and life; the latter goes on under the agency of heat and moisture alone. By the former process, a new and peculiar fluid is produced; by the latter no new element is generated, but the food is separated into its original gaseous constituents. By the former process, life is sustained and nutrition is effected; by the latter, complete death must ultimately occur; and life can no longer be associated with these so disengaged particles

until they have entered into new combinations, and have assumed new forms of vitality. It is quite possible, that putrefaction of the food should go on in the stomach; but then, this process is a morbid one, and is one form of indigestion.

It is a curious fact, that all the food in the stomach is not acted upon simultaneously; for that portion is first digested which is in close contact with the surface of the stomach; and this being sufficiently acted upon, it is moved onwards to the lower orifice of that organ; and fresh surfaces are thus presented to be successively acted upon; this process being carried on till the whole contents are digested.

There are some circumstances, which will favour or materially retard the process of digestion, particularly rest or unrest—mental disquietude or peace—grief or joy—the storm of passion, or the sunshine of contentment. In order to give a fair opportunity for good digestion to a weak stomach, food should not be taken *immediately* after exercise; there should always be a brief period of perfect quiet before taking the principal meal, and it should be invariably followed by absolute quiescence. After dinner almost every body is conscious of a feeling of

chilliness, and this has been attributed to the *new or cold* blood entering the system, entirely forgetting, first, that the chilliness takes place long before any new blood is formed,—and, secondly, that the food acquires the temperature of the body long before it is digested, and, therefore, cannot impart a sensation of diminished temperature to the blood. This feeling of chilliness really depends upon a large quantity of blood and nervous energy being sent to the interior, in order to favour the process of digestion; and thus the surface of the body is deprived of its usual supply of blood and nervous energy; and, therefore, it becomes chilly.

But if the stomach require a larger portion of these principles during digestion, it is manifest that any process which deprives it of that supply must be proportionally injurious. This was, some years since, put to the test of experiment, by sir Busick Harwood, who fed two pointers with the same food and at the same time; one was tied up immediately, the other was taken into the fields and hunted for some hours; both were then killed: in the dog which had remained at home, digestion was complete; in the other, which had been hunted, it was scarcely begun. In the case of the

pointer, we may suppose, that both blood and nervous energy were diverted from the stomach by the action of the muscles and the eagerness of the chase. Other experiments have shown, that after cutting off the supply of nervous energy alone from the stomach, digestion is altogether arrested; and the experience of almost every man proves that his digestion is troubled by whatever disturbs his nervous system, and causes him to spend thought and attention—especially anxious thought—on any subject whatever. The reaction of the stomach upon the nervous system is also shown by all the dreams, and nightmares, and horrid visions which are the consequence of indigestion. The lesson of practical wisdom to be learned from this disquisition, is the importance of the proverbial sagacity of our ancestors; and that "after dinner" we should "sit awhile."

At this stage of our inquiry, it may be as well to say one word of hunger and thirst. Much has been written upon the two phenomena with which it would be useless to encumber these pages. The absurd speculations which have been employed to account for these agencies, are only specimens of what may be accomplished by man's imagination, when he seeks to

be wise beyond his power. It is enough to consider hunger and thirst as being two great conservative instincts appointed for the preservation of mankind, and which would, if not perverted by the sophistications of art, lead mankind aright. The sensation of hunger does not arise from mechanical agency, but is simply the awakening of a nervous influence to remind the system of the necessity for taking food. Both sensations admit of being misunderstood: natural hunger and thirst are appeased by taking solid and fluid food; but there is a craving appetite depending upon disordered stomach, which is oftentimes mistaken for hunger; and there is a form of thirst which is caused by irritation of the stomach: neither of these conditions is relieved by following the course which they apparently prompt; on the contrary, the uneasiness is increased by such indulgence. It is very important to distinguish these states, especially thirst, in which the swallowing of fluids is so grateful, and so easy from the absence of the trouble of mastication, that a bad, possibly a destructive, habit is easily formed. The thirst which arises from great exercise, and profuse expenditure, will be relieved by a moderate supply of fluids; but

the dry tongue which results either from nervousness or stomach irritation, will not be relieved—indeed the latter will be aggravated: in the thirst of fever, or that arising from great heat without perspiration, a moderate quantity of cold fluid will often produce instantaneous moisture, and of course, immediate relief to the distressing symptoms.

The question of diet is one of deep interest, but would lead to disquisitions too extensive to be ventured upon at this time; we shall only remark, that it should not be exclusively animal or vegetable, but a mixture of both; and in our northern and uncertain climate there should be a considerable proportion of the former.

There are, however, peculiarities of stomach, which it behoves the individual possessor to study; and to avoid whatever he finds disagree with him, however much he may be fond of the particular article; for the desire after any given substance, and the power to digest it, are by no means commensurate. We shall only further notice the unhappy prejudice which seems to exist in our own country against rice, which, were it not for this prejudice, would form a cheap and nutritious article of food.

Now, it has been ascertained that well-boiled rice can be digested in an hour, while equally well-boiled potatoes require two hours and a half; .and upon this fact probably rests the prejudice against it; for labourers say, it does not "stay by them," and they prefer the sensation of distended stomach to the real nutrition which arises from the other shorter process; and this is a notable instance of the way in which unhappy prejudices are generated, and unfortunate consequences are evoked.

CHAPTER III.

Function of Assimilation of the Food, and Nutrition—Absorption—Of the Blood and its circulation—Cautions with regard to the treatment of Fainting.—Beautiful provision for fœtal and adult life.

WHATEVER the food may have been which has been introduced into the stomach, we must now consider the process of digestion as complete, and the resulting fluid, termed *chyme*, as passed forwards into the first or smaller bowels. Here it is mixed with bile and pancreatic fluid, and becomes *chyle*, certain parts of which are taken up by the absorbents, and carried into the mass of blood. Thus, then, the entire chyle is not absorbed; for although it contains all the nutritious parts of the food, yet it is also mixed with certain recrementitious particles, which do no good in the constitution, and which are ultimately to be separated from it by a process of depuration.

Throughout animal life, nature has taken so much pains for the confection of bile, and so

great evils arise from the arrest of this secretion, that it is manifestly one of the first and highest importance ; and there is a peculiarity about its formation to which, as beautifully illustrative of the wisdom and care of the Great Creator, we must invite your especial attention. The liver is the organ which secretes all the bile, and its great size would at once lead to the inference that its office was important. But there is this peculiarity about its secretion. In general, all glands are provided with arterial blood, and from it their respective secretions are produced. The circulation of the blood has not yet been described, and so much of that disquisition must be now anticipated, as to mention, that arterial blood is blood flowing from the heart, and venous blood is blood returning to the heart, after it has gone the round of the system, and has been deprived of its vitalizing powers, and has assumed to itself, in the course of its transit, certain matters which are no longer useful in the constitution. Now the liver is very sparingly supplied with arterial blood, only just enough to maintain its vitality, while, on the contrary, the blood which has been circulating among the organs of the interior, is collected together in certain *veins*, and

conveyed to the liver ; it is re-distributed in that organ, and then forms the secretion of the bile ; and this being separated from it, and reserved for another useful purpose, the blood is again collected, and sent to the right side of the heart, to undergo its ordinary circulation. Were the bile not thus strained off from the blood, that blood would soon become unfit for the purposes of life, and serious disorder, accompanied by jaundice, would be the consequence; whereas by being removed from the general mass, it is conveyed first where it is wanted to perfect digestion, and then to afford that gentle stimulus to the bowels without which their function would be sluggish. A more beautiful instance of the conservative powers of nature, and of the Almighty wisdom of the God of nature, than this contrivance for converting the useless and injurious into the useful and beneficent, is not to be met with. Thus, as we proceed, it will be shown, that the study to which your attention has been invited, is one which will give you juster ideas of yourselves, higher and ampler views of your relation to Him who is Lord of all, and will furnish higher motives to action ; in fact, will make you wiser and better.

The food having now undergone these essential changes—changes which may be called vital changes; for we can give no explanation of their progress nor imitate their results—it is prepared for a still further change, and for admixture with the mass of the circulating fluids. This is effected by another vital process termed absorption, by which the nutritive particles are separated from the general mass in the bowels; and when this process is completed, what remains is useless, and is to be eliminated. Not that every particle thus taken up into the system is employed in nourishing the body; for it is probable that, at this time, some parts are taken up, which are to be finally disposed of by the several excretions. This is stated only as *probable*, because it is quite *possible* that such changes may be taking place in the blood going the round of the system, so that these excretory principles may have been *acquired*. It is, however, more probable, that they have been originally taken up by the absorbents. This blood is, as will be shown hereafter, employed for various secretions, for perfecting the structure of the body, and for some *excretions*, to remove that which is no longer useful, or would become injuious to the system. There is also

a beautiful process, by which, under changing circumstances, a balance is preserved by the vicariousness of these secretions. Thus, during the summer, a considerable portion of recrementitious matter is disposed of by the skin in the form of perspiration ; and when this function is arrested, during the winter, it is compensated for by the increase of another secretion in close sympathy with it ; thus, nature has, in every instance, striven to maintain the balance of health and of power in the system.

We have spoken of the process of absorption, but we have not sufficiently defined the offices of the absorbent vessels : these vessels are of two kinds, namely, lacteals and lymphatics.

Lacteals are the vessels which take up the fully-formed chyle from the surface of the smaller bowel ; and these converging into trunks, and the smaller trunks into larger ones, finally terminate in a duct, by which their contents are conveyed into the blood, through the medium of the left sub-clavian vein, and thus the newly-elaborated matter is introduced at once into the circulating mass.

Lymphatics perform an analogous function, but their power is exerted over different substances, for while the lacteals convey fresh

life into the system, the office of the lymphatics is to remove the old particles which are no longer useful. Thus, if the office of the lacteals, which leads to the deposit of new, and the office of the lymphatics, which leads to the removal of old particles from the system, be nicely balanced, then there is health; but if that of the former vessels be too great, then there is hypertrophy, or an accumulation of fat; if of the latter, then there is atrophy, or wasting of the body; the former state leading to a variety of inconveniences and discomforts, mental and bodily, and the latter, if unchecked, terminating in the destruction of life. If the balance of absorption and deposition be nicely adjusted, all is well; but if not, whichever may preponderate, there is disorder.

We have thus traced the food from the first act of prehension, to its conversion into chyle, and its introduction into the blood. In the order of our review, we have now to advert to this important fluid, to its circulation through the system, to the changes which it undergoes under the influence of respiration, and to the consequences of such changes.

The blood appears to be a homogeneous fluid; but it will be found to consist of three constituent principles, which may be shown by a very

simple process. If blood be drawn, it will be found after a short time, to form, in the cup in which it has been received, a considerable coagulum, or clot, varying in size according to different circumstances, and surrounded by more or less of a watery fluid, which forms one of its component parts, and is termed *serum*. The aforesaid clot, if removed from this serum, and submitted to the agency of repeated washings, will be found by degrees to lose all its colour,—in fact, to be deprived of its red particles, and to retain only a whitish substance, which is called fibrine; thus showing the existence of serum, of fibrine, and of red particles, as the constituents of the entire blood. It would not appear, that the red particles are essential to life, for they are wanting in some animals; but, at all events, they are essential to the higher classes of warm-blooded animals, and, therefore, especially to man, to whose well-being they are indispensable. Wherever there is a deficiency of red particles, even in a moderate degree, there is a feeble constitution; the white fluids preponderate, and there is a disposition to the general failure of all the organs and functions of the body. Every portion of the animal economy is dependent for its health and comfort

upon a due supply of highly-vitalised arterial red blood: but, perhaps, the want of this is more immediately and imperatively felt by the brain; and also by all those parts which are dependent for their activity upon a proper supply of nervous energy. When the brain does not obtain its usual quantity of red blood, its entire system languishes: but this is more markedly shown upon the manifestations of mind. There can be no energetic performance of the organ of mind, unless it be supplied with good blood; the temporary absence of blood, suspending its functions altogether, as in fainting; while its undue accumulation first beclouds and then destroys its function, as in suffocation: even the slight deterioration of the blood from the atmosphere of a crowded room, renders the function of the brain uncertain; perception becomes dull; the faculties generally are obtuse; and the whole mind seems enfeebled. This state is produced, not only by the absence of blood, but by anything which decreases its red particles, or prevents their being duly vitalised by a process which we shall presently consider.

Every one is acquainted with the common state of a limb being what is called asleep;

and of a curious sensation termed "pins and needles," which attends the return of that limb to its proper state. It has been supposed that this condition arose from the circulation of the blood in the limb being interrupted, and that the curious subsequent sensations were dependent upon the return of that blood to its proper destined circulation. It is, however, no such thing: in the "sleepy" state, the circulation has not been impaired or altered; the great nerve which supplies the limb has been pressed upon, and the nervous communication has been interrupted,—so that, for the time being, it is cut off from the organ (the brain) and the will has no influence over it, and cannot move it at all. But the pressure being taken off, the nervous influence returns; and when this is completely effected, volition and consciousness are restored to the affected limb, and it is as it was before the original pressure had been applied. It is very important not to confound phenomena produced by the one as originating from the other system.

Blood may exist in the body, in too large, as well as in too small quantity; in the former case the system is congested and oppressed; it loses its elasticity—it becomes languid—and the

patient complains of being weak. In this case, nature endeavours to relieve the fulness of her vessels by the deposition of fat; and if she is unable to obtain sufficient relief in this way, the individual b comes sleepy and dull, or fearful and taciturn, or hypochondriac. In such a case, the removal of a small quantity of blood, and a proper attention to diet to prevent its re-accumulation, would restore the patient to his wonted alacrity.

A great mistake is often made on the question of diet for such cases: it is supposed that the blood is too rich, and that it must be impoverished by withholding animal food—by substituting a vegetable diet—by suspending the use of all alcoholic fluids—and by enjoining the use of water without limit. This system will rather tend to increase than diminish the torpor: true, indeed, that the power of vitality will be decreased; but the quantity of circulating fluids will, perhaps, be augmented, and the evil will not be relieved. The diet should be nutritious, but taken in small quantities; a moderate supply of animal food should be enjoined, with plenty of exercise, and an active mind and body, while the generality of innutritious fluids should be rigidly restricted;—

and vegetable substances should be sparingly employed.

But if blood-letting be used unsparingly, or *à contre tems*, the individual first becomes faintish; his lips and countenance are blanched; presently he loses consciousness and drops fainted from his chair. If, under these circumstances, he is treated prudently; if he have plenty of fresh air, and the body be allowed to lie prone, he may quickly recover. But I have known so many fatal instances arise from persons being propped up while they were fainting, by the misdirected kindness of injudicious friends, that I am induced to say one word more upon the subject. Fainting arises from the want of a due supply of blood to the brain; the heart has not power enough to send it in the required quantity against the influence of gravity; and here is an instance of nature's conservative instinct: for now the body left to itself, falls to the ground; the heart has only to send the blood along a plane surface, and not against the influence of position; and thus, left to itself, the circulation is quickly restored. But if the body be now propped up, the heart has still the same difficulty to encounter; sometimes it is unable to overcome it, and the

simplest case of suspended animation from fainting is converted into permanent death. Always remember this when your friend faints; lay him prostrate—even take away the pillow from under his head; give him plenty of fresh air; and sprinkle a little cold water suddenly in his face, in order to bring into play the muscles of respiration; this is applicable to all cases of fainting.

Another caution may be here added:—when fainting arises from loss of blood, occasioned by an accidental wound, or by any constitutional cause which cannot be controlled, do not be alarmed at it, nor anxiously seek to remove the fainting: it is nature's method of stopping bleeding, and it will prove the most effectual styptic: do not, therefore, attempt by cordials or other stimulants to recall the activity of the circulation: there will be no bleeding while the faintness remains; give nature time to adopt her own method of stopping the mouths of the bleeding vessels; and you will often have the satisfaction of saving a friend, who might have been lost by ill-timed activity,—or of giving opportunity for tying, and therefore permanently stopping, the mouth of the bleeding vessel.

Returning from this digression which has

arisen from contemplating the effect of the sudden loss of blood, we must notice the usual consequences of the absence of a due supply. Here, even as nature endeavours to relieve herself from the oppression of too much blood, by the deposition of fat, so does she also seek to relieve her wants arising from its absence, or rather from its scarcity, by taking up all the fat she can acquire. This is strikingly exemplified by the absorption of fat during long illness, as well as during the hybernation of animals, which come out from their winter quarters, almost skeletons. It is also seen in the sallow colour of the skin—the pearly whiteness of the eye—the bloodless lip—the indisposition to exertion of every kind—the breathlessness upon motion—the palpitating heart—the feeble digestion—the weakened brain—and all the miserable feelings of painful and universal consciousness. This state is one very frequently mistaken for mental listlessness, and indolence, and indisposition towards exertion; and it is sought to be superseded by compulsory exercise. However well intended, nothing can be more cruel; it is to ask for action where there is no power; and the only rational mode of treatment is, first to restore the red

blood and the power,—and then ask for action, and it will readily be given.

There is a difference in the colour of the blood, according to the vessels in which it may be found:—in one set of vessels proceeding *from* the heart, it is of a bright red,—and in another set of vessels returning *to* the heart it is almost black; and this black blood is again changed in colour, by passing through the lungs; and this brings us to notice the mechanism and effects of the circulation.

The circulation is performed by the heart, and the vessels proceeding from, or returning to it. In the lower order of animals, there is only a single heart,—but in all warm-blooded animals, and of course in man, there must be a double heart, performing two distinct offices. The double heart is composed of four great cavities, two of which are called auricles, and two ventricles; one of each being disposed on the right and the other on the left side of the heart; and in a healthy condition, these cavities are provided with valves, to insure their properly filling—to direct the exit of the blood—and to prevent its retrogression into those cavities from which it is intended to be expelled. The agency is this:—the left ventricle being

filled with blood, contracts, and expels its contents into the aorta, or largest artery of the body; by it this blood is propelled into all its larger and minuter ramifications, to a degree of divisibility so great as almost to exceed belief. These arteries then terminate in veins, the minute branches of which, with astonishing rapidity, take up and collect together all this so distributed blood. The minutest veins terminate in larger ones—these in still larger, till they too are collected into two great vessels which bring their blood to the right auricle of the heart, whence it is passed into the corresponding ventricle, thence distributed by the pulmonary artery and its various ramifications throughout the entire substance, and interior surface of the lungs, during which course it undergoes a change we shall presently contemplate: then, having been rendered fit for all the purposes of life, it is collected together and brought back to the left auricle, again to take the same untiring round—again to undergo the same changes of exhaustion and renewal.

There occurs in this portion of the animal economy a provision so beautiful that we must solicit attention to it for a few moments, as an illustration of the wisdom, and the power, and

the prescience of Him who made all things, and by whom all things consist. The instance alluded to, is the change from the single heart of *fœtal life*, to the double heart of *adult life*. In order that the first process of breathing should be fully established, it is necessary that the blood should circulate through the lungs to undergo changes there, which would be useless before, because the blood with which fœtal life is maintained is furnished from the maternal system; consequently, before breathing, the blood is not sent from the right side of the heart to the left side intermediately through the pulmonary circulation, but immediately by a direct communication; and so soon as adult or breathing life is established, the aperture of communication is closed up. Whenever, as it occasionally happens, this closure is not complete, there occurs a mixture of the black blood of the right side of the heart, with the red blood of the left; the effect is very marked on the countenance, and it constitutes the blue disease. Under such circumstances, life is sometimes continued for years, but it is dragging on a miserable, and feeble, and useless existence, only to be early extinguished. How exquisitely beautiful is this provision, by which the single heart of

fœtal is converted in a moment into the double heart of adult life, and this by the mere stimulus of respiration! How thoroughly does this set at nought the wisdom of man! How completely does it put to silence the folly of those who tell us of life consisting in the mere play of our organs! How satisfactorily does it show, that nothing but Infinite Mind could have provided for such a contingency!

This would also be exemplified by another fact in the history of the circulation, namely, the very disproportionate quantity of blood sent to the brain, as compared with its size, a sufficient evidence of the high importance of the organ, and of its need for a large supply of highly vitalized blood.

The discovery of the circulation of the blood, which was unknown before the year 1620, is attributable to a countryman of our own by the name of Harvey, ascertained by experiments on a dog, whose name Lycisca, and whose sufferings, and whose usefulness to mankind, have been immortalized and handed down to posterity in some beautifully touching lines.

Harvey suffered the usual fate of other great discoverers, and of those who have stepped before their generation, either in thought or action.

He was unjustly maligned and persecuted, and it was only when his ear had been removed from praise or blame that his discovery was appreciated. An important lesson is to be gained from this fact, as well as from the consideration that it was only in 1620 that this simple process was ascertained; and yet before this period, men thought themselves as wise as they now do, when any extension of our present circle of knowledge is propounded.

CHAPTER IV.

Function of Respiration, and the changes thereby effected on the blood—Composition of the atmosphere—Respiration of plants—Practical hints arising from atmospherical changes during respiration.

THE function of *respiration* is that by which the blood is exposed to the influence of the air in the lungs, and is rendered fit for the nutrition of the body, and for the stimulation of its several organs, enabling them to perform their functions, and to maintain that comfortable play of the organism which is termed *health*. Every individual is conscious of discomfort when he is unable to obtain a sufficient supply of fresh air; everybody has felt the misery of being in a close and crowded room, where the air has become impure from repeated respiration, and consequent deterioration; and without being aware of its cause, has complained of the closeness of the atmosphere, "so close that he could not breathe." This effect is very generally, but erroneously, attributed to the heat; the fact is,

that the temperature is hardly ever raised to such a degree as to be injurious to life, but the air has been deprived of its oxygen, the blood has not been properly renewed; the organs receive a mixed supply of black and red blood, the head almost immediately suffers, and then every function of the system is disturbed, and then is produced that miserable feeling of suffocation and oppression which arises from the blood seeking after, and not being able to obtain, its necessary renovation.

The air is not that simple fluid which it appears to be, but is composed, for the most part, of oxygen and nitrogen, possessing also a small quantity of carbonic acid, which is especially designed for the promotion of the growth of plants. Of these gases, oxygen alone would be too highly stimulating for the continuance of life and health; nitrogen alone would be incapable of supporting animal life, and, indeed, it would seem that the principal use of nitrogen is to dilute the oxygen of the atmosphere, so as to render its proportion just adequate to the wants of the animal economy; while the carbonic acid gas, which is destructive to animal life, exists in so small a proportion, as not to be appreciated by the feelings.

It is true, that pestilential gases are often mixed up with the atmosphere, and yet are not detectable in the present state of our knowledge. Examples of this unhealthy condition are to be found in the aguish districts of Essex and Lincolnshire, in the malaria of the Pontine and other marshes; in the influenzas which have occasionally visited our country; and in the prevalence of measles, and scarlet fever, and hooping cough, and small-pox, none of which are discoverable by the nicest tests with which we are acquainted. There are agents at work, unseen, unknown, undemonstrable, and yet producing effects of a widely destructive nature.

Without going all the length of some "health of towns" enthusiasts, it may be well to call the attention of all to the influence upon health and comfort arising from the noisome and pestilential effluvia extricated from masses of decaying animal and vegetable matter—and from the putrefactive changes undergoing by heaps of refuse matters allowed to accumulate in stagnant pools, and so to impregnate the atmosphere with gases incapable of supporting life, and calculated when breathed and received into the blood by this process, to produce that disorder which is generally termed fever. Hence

the great importance of cleanliness, of drainage, of sewerage, of the removal of accumulating nuisances, and of an abundant supply of pure and fresh water.

One very remarkable property of the oxygen of the atmosphere, is its free constitution, and its tendency to combine with other bodies; this is very simply, yet clearly exemplified in its disposition to combine with iron, thus forming rust, or an oxyde of iron, and everybody knows how difficult it is to prevent this combination. This state of freedom on the part of the oxygen, however, facilitates its combination with the carbon of the blood, and thus renders easy the effectual removal from it of that injurious substance, as will be presently shown; a removal which is accomplished to the astonishing extent of about seven ounces of solid charcoal in the twenty-four hours.

The mechanism by which the process of respiration is effected, is this;—the diaphragm in inspiration bends down upon the stomach, so as to enlarge the cavity of the chest, which is still further augmented by the intercostal muscles pulling up the ribs, thus forming a certain amount of vacuum into which the air rushes and pervades, and fills all the cells of the

lungs; the process of renovating the blood is effected, and the robbed air despoiled of a portion of its oxygen is expelled by another set of muscles which pull down the ribs, and by the contraction of the diaphragm, aided by the elasticity of the lungs.

During this process, the air has undergone a considerable change; it possesses less oxygen, and far more of carbonic acid; and it is found that the loss of the one is equivalent to the addition of the other principle, the nitrogen remaining nearly the same. Now, how is the change effected? The air has come into contact with the black blood of the right side of the heart, rendered thus black by the presence of carbon; the oxygen has gone over to the carbon and formed carbonic acid, and in this way, the one is lost, and the other is gained, and the blood has acquired a bright red hue. For the purposes of respiration, however, it is obvious that, by this change, the air is deteriorated, since it has parted with its life-giving, life-invigorating principle, and has received a gas, which is not only incapable of supporting, but is in itself destructive to animal life. Such is the effect of a single respiration; and if this process be repeated in close and ill-ventilated

apartments, the air becomes less and less fit for the purposes of renewing life ; the muscular strength is enfeebled, the breathing is oppressed, the head aches, a listless feverishness is established ; and in an extreme state, life is extinguished amidst torments of the most cruel description. It is right to mention that a certain quantity of water is exhaled every time that respiration is completed.

There are some practical hints to be gained from this simple history ; and those especially regard the quantity of air required, and the mode of its introduction. That these may obtain the greater claim to attention, it may be as well to state the amount of deterioration which the air receives during breathing. We have already mentioned that carbonic acid is more largely found in the air which has been respired ; that from this, solid carbon may be separated ; and that seven ounces of this substance are ascertained to be dismissed from the system in every twenty-four hours. It will be easy to comprehend, therefore, how largely the air is deteriorated by the process of breathing It has been also found, that the quantity of atmospheric air required during each twenty-four hours for every individual is 1,152,000

cubic inches, or 666 cubic feet; so that quantity and purity of air are both essential to life. With regard to purity, all-bounteous nature has provided a remedy for this constant deterioration of the atmosphere. The food of plants consists for the most part of water, and carbon, and some ammonia; the first two principles are obtained from the atmosphere. Thus, the respiration of animals seems especially designed for the removal of carbon from the system, and for the introduction of oxygen; the respiration of plants, on the contrary, seems designed for the introduction of carbon, as separated from the atmosphere by the upper surface of their leaves, and for the breathing out of oxygen from their lower surface. A perpetual supply of oxygen, and renovation of the atmosphere, is thus effected; man deteriorates the atmosphere he has breathed; but in the all-wise arrangements of providence, this deteriorated air is fitted for the purposes of vegetable life, and by its economy of respiration, the oxygen of the atmosphere is renewed, and rendered fit for again supporting animal life. Perhaps a more beautiful illustration of the wisdom and goodness of God is not to be found among the works of nature.

It should have been remarked, that more oxygen is removed from the atmosphere, than combines with the carbon to form carbonic acid; and it appears from the great facility with which oxygen enters into combination, that a portion of it is absorbed, especially in young animals. And without entering deeply into the question of why this is the case, or embracing all the speculations to which it would lead, it will be enough to say, that oxygen is a vital stimulant, too great a stimulant to be borne by the system undiluted, but still so necessary in a proper degree of dilution, as that, without it, animals do not long support life, at least not in its healthy functions and relations.

Having wandered somewhat from the practical hints proposed to be given as to atmospherical influences, we now notice, that the two great objects are to secure an abundance, and a renewal of air: for these purposes, rooms should be spacious and well ventilated; and it is not sufficient that they should be the one without the other. The experience of mankind generally is, that a small room is colder than a large one; then why this seeming anomaly, always supposing the fire to be proportionally the same? Simply, that the means employed

for ventilation, aided by the pressure of the atmosphere, produce so rapid a current through the small space, as to keep up a perpetual draught, and ventilation is not to be effected by a draught. The great object should be to ventilate rooms during the winter, without having recourse to the immediate external atmosphere for this purpose. If admitted, as it too generally is, it is loaded with moisture, and is very cold; a chilling draught is produced, and, with the susceptible, catarrh is the consequence. The arrangement should be, to admit the fresh air from the basement story; to warm this air, which is then to be distributed by open doors over the whole house; provision having been made for the escape of the air which has been respired and deteriorated. This provision is to be made first, by lofty rooms, the deteriorated air always seeking the upper part or ceiling of the apartment,—and from this upper part a way of escape should be provided. If windows be opened at all during the winter, they should be opened from the top, which would allow the injured air to escape, and not from the bottom, which does not effectually renew the air, while it occasions a terrible current between the window and the fire-place. Open windows are

unnecessary during the winter season, because, there being fires, a sufficient demand will be made for the admission of fresh air from the passages, which, by the proposition, has been previously warmed, and rendered more fit for the purposes of health.

It is a very common custom to open bed-room windows during the winter, and to leave them open till after sun-set; but it would be much more conducive to health, to light a fire in every room, for half an hour each day, leaving the passage doors open, by which means a complete change of air would be effected without risk. According to the plans at present too commonly adopted, what is the result? A cold moist air is admitted into the rooms for eight or ten hours, and everything in the room becomes cold and damp; and, in general, the only way of removing this state is by the individuals sleeping in the rooms, warming the air and drying the damp clothes, by parting with their own heat, their own vital energy; and yet from year to year this same fatal system is pursued. A good housemaid well knows the injury done to her furniture, and the discomfort to her patrons, occasioned thereby, and you will always find them avoid-

ing these evils: but such are few, and rarely to be found. Health and comfort are to be obtained by the indirect admission of fresh air into the rooms, and not by that murderous contact with the external atmosphere, which is generally effected by windows thrown open from the bottom sash. Many persons adopt this system from the idea of hardening themselves. This is a most mistaken idea: it is true that habit may reduce liability to impression, but where one life is thus saved, hundreds are sacrificed every year in our own country, where nearly one-fifth of the entire mortality is occasioned by consumption,—the English disease, as it is called;—a disorder to which we are peculiarly liable, probably from the great and frequent changes of our climate, and from our not employing the precautions observed in less temperate regions. Recent statistical data would seem to show that we are not more liable to consumption than our neighbours; but statistical tables, unless very carefully prepared by parties free from prejudice, are very apt to partake the previous opinions of the compilers: and in the present instance an obvious source of fallacy presents itself, namely, whether we and our neighbours

restrict the term consumption to the same form of malady.

We have recommended that the air should be warmed in the basement story; but care should be taken that the air thus warmed should not be too dry; for during the process of respiration, the lungs receive moisture from the atmosphere, as well as subsequently give it off. Everybody has felt the inconvenience arising from too dry an atmosphere, as in the east wind; everybody is conscious of the misery of an east wind, and it is principally the quality of dryness, which parches the skin, and constitutes this misery. Everybody who has had such an unfortunate opportunity has experienced the severe distress of occupying a room warmed by an Arnott's stove, without the proper precautions having been taken. If, therefore, such means have been resorted to, for the purpose of procuring warmth, it is necessary that a very large bason of water should be placed on the top of the stove in order to insure a supply of moisture for the dried atmosphere.

Another mistake is frequently made on the subject of the atmosphere. Persons have been

in crowded rooms, and become over-heated, and they wait till they have become cool, before encountering the open air; and in the winter they will not go out warm from the fire for the same reason: and on the opposite side of the question, when they do come back from their miserable walk dreadfully cold, they rush to the fire. Now all this is wrong: cold is not generally taken by passing from a hot to a cold atmosphere, but from a cold to a hot one. Go out warm, even when perspiring, with plenty of non-conductors of heat about you, and no mischief will happen: wait till you have become cool, and the system depressed, then go out, and cold is taken instantly. So, on returning home cold, and going immediately to a fire, a similar result will almost invariably follow. A proof of this position will be found in the fact, that at the commencement, and during the continuance of, winter, cold is not frequent: but at the breaking up of a frost, or during the spring, catarrh is almost universal. Where the lungs are sensitive the admission of cold air should always be avoided, and this may be effected by means of the respirator, the principle of which is

simply, that by it the air is warmed. Thus the air expired gives caloric to the metallic plate of which it consists, and the caloric thus acquired is parted with on the next inspiration to the air entering into the lungs, and thus the great excitement is avoided.

Thus, then, we have seen that the blood arrives at the lungs loaded with carbonaceous matters: that it there comes in contact with the atmosphere, from which it receives oxygen, and parts with its carbon, which, in its new combination, forms carbonic acid; that from these changes the blood loses its dark colour, receives a bright vermilion hue, and acquires a greater amount of vitality, thus becoming fit for all the purposes of life; and that during its course round the system it is perpetually distributing warmth, and equalizing temperature. The necessity for these changes is abundantly shown by the one fact, that so long as the brain continues to receive this so renewed blood, so long is its vitality maintained, so long is it nourished and stimulated, and strengthened, and enabled to direct the whole system: while, give it for a short time only, the undecarbonised blood, and the sensorial functions are disturbed and presently

destroyed. To explain this is impossible: we know it to be the fact: and we can only acknowledge and admire the infinite wisdom which so transcends and eludes all our best-directed investigations.

CHAPTER V.

Theory of animal heat—Influence of atmospherical changes—Of the voice—Sighing—Coughing—Sneezing—Laughing—Yawning—On the locomotive organs.

We must here notice a little more particularly the evolution of animal heat. We have already told you that the blood receives from the atmosphere more oxygen than combines with its carbon to form carbonic acid: therefore, arterial blood, or that which is sent from the lungs to the left side of the heart, contains oxygen in a free state, or, at all events, in a state of such loose combination that it is separated from it with great facility. And as this fluid reaches the extremities of its capillary circulation, the oxygen is exchanged for carbon, which replaces it in the venous blood. The carbon which is thus received into the blood is detached, or rather disengaged, from the tissues during this process of vital combustion: and its union with oxygen, which is the means of its disengagement, must be

accompanied, as in the processes of inorganic chemistry, with a liberation of caloric. This distribution of animal heat is pretty uniform throughout the whole system, though it is liable to apparently accidental varieties: as, for instance, in the sensation of heat, called heart-burn, dependent upon acidity in the stomach. How far the development of animal heat may be under the influence of the nervous system we are not yet prepared to say: certain we are that, under the emotion of fear, and other depressing passions, and even under the influence of deep thought, the body becomes cold: while, on the contrary, other mental emotions will produce blushing, accompanied by a partial evolution of heat: but we are not able to say in what manner these changes are effected. It is desirable here to notice a necessary caution with regard to blushing: it has been supposed to afford presumptive evidence of guilt where a party has been accused: and it may be so. But blushing as frequently results from mere nervous susceptibility, or from the spotless consciousness of innocence, and the horror of a suspicion of crime, and far more frequently than from the shame of real turpitude.

It is quite possible that there may exist some other undiscovered source of animal heat, because the amount of warmth given out during a certain time to the surrounding medium, is greater than that which could have been produced by the combustion of a quantity of carbon equivalent to that which has been breathed out during the same period. We must not, however, forget that this is a vital process, and that, characterised by life, it may be so modified in a way inexplicable to us, as to produce effects beyond the reach of chemical calculation.

That is a beautiful arrangement of Providence by which man produces a greater quantity of caloric during the winter than in the summer, and also, that, when he most requires it, he can aid the productions of this warmth by exercise. In the summer time, there may be, and often is, an accumulation of heat in the body; and hence those languid feverish feelings which accompany a high temperature and a dry skin. But all-bounteous nature has provided the process of perspiration for the relief of this condition. Perspiration is nature's cooling process: by it the temperature of the body is immediately lowered, thirst is

relieved, and the misery of heat is gone. Persons never suffer really from heat when once perspiration is established. In our variable climate, the body should always be protected by flannel during the entire year. Of course flannel has no warmth-giving property: it is a mere non-conductor of heat, and by this quality it will keep in the warmth of the body during the winter, and will keep out the rays of the sun during the summer. Flannel, therefore, next the skin should be worn all the year round, the changes according to the season being made in the external garments. It should always be recollected, however, that in our own country the most dangerous and treacherous part of the year is the spring, and that there should be no haste to throw aside winter garments. The great objects of diminishing the sensibility of the skin to blasts of cold air, and vicissitudes of season, of keeping the body free to insensible perspiration, and of avoiding the excess of this process, would be materially promoted by universal daily ablution with cold water, and by thoroughly rubbing afterwards with a dry coarse napkin. Due attention to the skin is not generally given: if the face, hands, and feet, are washed,

persons think themselves cleanly, in entire forgetfulness that the skin requires the daily removal of its own secretions; that it is a most important organ in carrying on a system of depuration of the blood: and that the lungs and the stomach and some other organs are invigorated in their healthy actions, and fall into disordered function, according to the more or less perfect condition of the skin.

The influence of atmospheric changes upon the processes of respiration and of the circulation is very considerable, particularly in respect of its low or high pressure, its dampness and its dryness. When the pressure is high, the body is elastic, and there is a feeling of comfort diffused throughout the system, which adds enjoyment to life, and gives a free command over the mental processes; but when the pressure is light, precisely the opposite feelings are induced; the body misses its support in the first place as a mere erect mass of fibre, but it does so also, in regard to the circulation of the blood: the flow of blood in the veins being greatly dependent upon atmospherical pressure, if this be diminished, that is languid:—the right side of the heart is not duly supplied, the lungs do not regularly

obtain all they require: breathing becomes a burden, the blood is not oxygenated with sufficient rapidity, the brain suffers from diminished vitality, and again the whole system is disturbed. We have already pointed out the evils arising from a lost balance in the dampness or dryness of the atmosphere; but we have not mentioned that this peculiarly affects the evaporation of fluids from the skin and from the lungs. Where neither state of dampness nor dryness is in excess, the functions are carried on well; but if there be too great dryness, aqueous vapour is rapidly carried off from the skin, from the mouth, and from the lungs: the skin becomes crisp and parched, the tongue dry, the sensation of breathing oppressive in consequence of the absence of moisture from the mucous surfaces, while, if the dampness be excessive, aqueous evaporation is not carried on as it ought to be, the atmosphere has no avidity for moisture, this is consequently retained in the system, and oppression and languor are the result. It will be seen, how thoroughly these doctrines are opposed to popular prejudice, which is ever sedulously guarding against damp, but scarcely ever takes a precaution against a dry atmosphere,

whereas the evils produced by the one are nothing when compared with those occasioned by the other. It is not intended to affirm that it is unnecessary to guard against damp, especially against its partial application; but it is distinctly asserted that the risk to general health arising from moisture in the air is not equal to that arising from its dryness.

The subject of respiration can scarcely be dismissed without a few words on some of those processes in support of which it forms a phenomenon of so much importance. The voice as such is common to man and other animals; they all utter sounds, expressive of emotion and passion, of joy and sorrow, of pleasure and pain, of enjoyment and of suffering, of fear or confidence, of rage and defiance, of affection and satisfaction, of dislike or approbation: and these sounds are easily comprehended by their fellows. But animals do not speak, they do not utter articulate sounds, because they do not think, they do not reason. This is the great distinguishing feature of man: he alone possesses language, because he alone requires language to express his thoughts and reasonings.

We must pass over the mechanism of the

voice, because it would lead us too far from our present purpose, and because without diagrams, and without supposing, on the part of my readers, previous anatomical knowledge, we could not make the subject comprehensible. The voice must also be characterised as a vital phenomenon, and cannot be produced without life. The attempt has frequently been made with automatons, but wretched indeed has been the failure! how poor has been the imitation of the human voice, even in its most successful attempts, is well known. Sounds may be produced by musical instruments constructed in imitation of the larynx: but *voice* never has, and we venture to say never will be produced; because it requires that influence of life and that amount of nervous energy which cannot be imitated, and for which no substitute can be found. The voice is not only destroyed by the loss of life, but also by cutting off the connexion of the larynx with the brain, as by destroying or paralysing the laryngeal nerves. It is rather a curious circumstance that this sudden loss of voice will be sometimes occasioned by nervous emotion only, and in this case, after long continuance, it will sometimes be as suddenly restored.

There are certain other processes which are, in fact, respiratory functions, and at which we must just give a passing glance, as, for instance, sighing, coughing, sneezing, laughing, and yawning.

The first of these, or sighing, is one of nature's conservative processes, and seems to originate in the following manner: when from some absorbing passion the mind is concentrated within itself, and one exclusive object of sorrow or annoyance seems to take possession of the man, not only is he unconscious of surrounding objects, and careless of many of the ordinary duties of life; but the brain seems also in some measure forgetful of the vital functions, the frequency of respiration is diminished, the blood therefore does not undergo its proper change in the lungs: those organs become oppressed from the want of a sufficiency of fresh air, the heart feels ready to burst with its accumulated load, and the deep sigh is evoked, in order thoroughly to expand the chest, and to obtain such a supply of fresh air as shall, for the time at least, relieve the oppression of the congested lungs, and liberate the right side of the heart from its accumulation. The groan which oftentimes accom-

parties sighing, is when the deepest anguish attendant upon sorrow, is uttered by sounds which accompany the expiration of the sigh. In a similar way, sobbing is produced by a convulsive action of the respiratory muscles, where there has been previously much crying, and where those muscles have become distressed by the unnatural action to which they have, in consequence, been subjected.

Yawning, that presumed affront to society, is generally resulting from listlessness, or ennui; there is a want of energy or elasticity about the nervous and muscular systems generally: the muscles of the chest partake of the weariness, and the blood is imperfectly oxygenated, and hence the necessity for more air. But the cause which produces this necessity being different, so also is the mode of its expression varied; for whereas, where the cause has been grief, the effect is obtained by sighing, so also is it equally obtained by yawning where the producing cause has been ennui; and, in the latter case, there is not only the deep inspiration of sighing, but also a prolonged expiration accompanied by a peculiar sound.

Coughing is one of nature's conservative agencies and arises from the presence of some

cause of irritation in the air-passages, the removal of which it is intended to effect. Thus cold has been caught, and a secretion of mucus from the chest or windpipe has been the consequence: cough is for the purpose of removing this mucus. Now, were there no other cough, but with this object, it would be a good and not an evil; but sometimes it is a mere cough of irritation produced by inflammatory action, or nervous irritability, or sympathy with the stomach, or some other organ beneath the diaphragm. In all these latter cases, cough should not only not be indulged, but it should be energetically opposed, for it can only be mischievous and increase the irritation. Cough should only be permitted when its object is to remove a foreign body or disordered secretion, and, in all other cases, when it is a dry cough, it should be strenuously combated, while the immediate or sympathetic cause should be studied in order to its removal. It is quite incalculable the injury which is done from want of attention to this simple truth. Where so many fall victims to consumption in every year, it is most important to detect the first symptoms of irritation of the chest, and by energetic volition to insure rest to the lungs,

rather than exasperate their earliest deviation from sound function by the perpetual restlessness of reiterated coughing.

The process of sneezing differs very little from that of coughing, only that the cause of irritation is differently situated, namely, within the nose: and this may arise from its inner surface being too highly sensitive to the admission of cold air, or from common cold, or from the presence of some accidentally irritating substance, snuff, for instance. In all these cases, it is essential to quiet respiration, that these irritating causes should be removed, and therefore is developed another, though a similar associated action of the respiratory muscles, by which the air is forced rapidly through the windpipe in the one case, and through the nostrils in the other, dislodging and carrying with it whatever irritating matters may be present.

Lastly, laughter is an analogous process proceeding from a very different cause. It seems to consist in a full inspiration followed by a number of short convulsive expirations peculiarly fatiguing and distressing to organic life. Between the paroxysms of hooping cough, and the loud coarse sounds of obstreperous mirth,

there is so little difference in sound that the one may readily be mistaken for the other, when the eye cannot come to the aid of the defectively instructed ear. Laughter is an expression of mirth which is peculiar to man: and even in him it seems rather misplaced, for it is always distressing to him, and, as it has been most justly said, "Laughter seems to be a force done to nature, and most frequently ends in a sigh." All these processes are sometimes only symptoms of disorder, and should, therefore, be carefully distinguished as to their originating cause; when found unconnected with mental phenomena, they are commonly hysterical symptoms, and indications of grave disorder in some part of the system. Nervous symptoms, as they are called, are not to be despised, and treated as if they were only another name for the offsets of ill-humour. It is true that they may be counterfeited—that they may be brought on by mental causes: but, after all, the reality of nervous disorder, as a purely physical phenomenon, cannot be questioned, and inasmuch as very slight nervous symptoms may be the expression of very destructive malady existing in some part of the system, it behoves the friends of the sufferer

not to esteem lightly these expressions of ill-health, but diligently to search for the hidden cause in whose nervous shadow we detect the existence of some serious agency interfering with the continuance of life and health.

A few words will suffice for the locomotive organs. Man possesses an arrangement o bones and muscles, which enable him to transport himself at pleasure, though slowly, from place to place: and his knowledge and his scientific skill have enabled him to avail himself of the bones and muscles of other animals, and of suitable carriages, by which he has added to his means of transit: and latterly, the almost illimitable powers of steam, as if in cruel mockery of his comparative feebleness, have laughed to scorn all his former efforts at transposition, have all but bidden defiance to control, and hence so completely annihilated space, that we no longer calculate distances by the number of miles, but by the duration of the interval which elapses between our leaving home and our arriving at the place of our destination, some hundreds, or, perhaps, thousands of miles away. Our present business, however, is with man's own powers of locomotion; and these consist in bones and joints and ligaments,

supported and moved by certain muscles and tendons, these again being stimulated into action, and directed by the will acting through the nervous system, or at least, that portion of it which is termed the *excito-motory*. In this case, it is clear that the bones are perfectly passive; and their business in this function is to afford surfaces for the attachment of muscles, and to give the requisite degree of consistency and support, so as to insure the due performance of the mental behests. It should be remarked, that the muscular system is characterised by its precise and exquisite adaptation to the function it is called upon to perform; and that in it are to be found, not only the most perfect examples of the laws of dynamics, but also the most beautiful contrivances to effect certain great natural purposes—more than enough to show that we are "fearfully and wonderfully made," and to proclaim the skill, and goodness, and prescience of the Divine Artist.

All muscles, however, are not governed by the will: there are those which are purely voluntary; there are those which are perfectly involuntary; and there are those which occupy a position between the two—that is, being partly voluntary and partly involuntary. Va-

miliar examples of the three may be given in the muscles of the arm, or of the leg—in the muscles of the heart—and in the muscles of the chest. And the reason is obvious: it was necessary that man should be able to transport himself whithersoever he pleased, and, therefore, the pure muscles of locomotion are absolutely under the control of the will; it was necessary that the action of the heart should be constant and uninterrupted, and, therefore, its unvaried beating is pursued night and day without our control. It was necessary that man should be able to hold his breath, as in listening,—but it was equally necessary that he should not be able to maintain this suspension of breathing beyond a certain time. Hence he holds his breath at will; but after a longer or shorter interval, according to the capacity of his chest, in spite of his firmest will, the muscles act automatically, pull up the ribs, and he breathes. There seem to have been very few examples of persons who were able to suspend the function of respiration so as to cause absolute death, as in the instance recorded by Dr. Cheyne: but these are stated only as exceptions to the general rule, and confirmatory of that rule.

Muscular fibre is an index of the strength of the individual: when he is in good health, there is firmness of fibre; but when his health is failing, the muscular fibre is weak and flabby. There are oftentimes antagonising muscles, as, for instance, in those which bend and extend the hand: the former are the stronger of the two, as may be shown by any one who will make the effort to grasp a body, or to relax that grasp by extending the fingers; the muscles which pull down the jaw are much more feeble than those which close it, for a very obvious reason; and the greatest inconvenience is occasioned by any loss of the balance of power in this antagonism, producing contraction of the head in the one case, and locked jaw in the other. The usual form of wry-neck is also another example of this broken antagonism, and is the cause of much distress.

Another law attaching to muscular fibre, is its development by exercise, and its wasting by entire rest; the arms of the blacksmith—the shoulders of the coal-heaver—the leg of the pedestrian—and the withered arm of the beggar, produced by being bandaged for a few weeks to his side, will present obvious examples of this law, which is very extensively operating,

though in an inferior degree, among all those who do not take active muscular exercise. This principle, which, in itself, is a conservative law, and one adapted to fitting the body for its peculiar situation in life, is sometimes the cause of very serious evil; as, for instance, in the heart, which, if called upon from any cause for much exertion, has its fibres so increased as to produce very mischievous enlargement. Evil also sometimes arises from the partial loss of this power, or from its unequal development, as, for instance, in the lateral curvature of the spine. On either side of the spinal column are muscles which should be of equal power, and should act so as to maintain the perfect uprightness of that column: but from some cause or other, one side, or set of muscles, becomes stronger, and the other weaker; the balance of power is lost, the stronger muscles pull the spine to one side, the weaker yield, and by degrees, and by repeated and long-continued agency of this kind, lateral distortion is produced.

The great utility of muscular fibre is in transporting the animal from place to place, and in performing those actions which are necessary for the conservation of life. Now

this effect is dependent upon the property of contractility, which is inherent in muscular fibre, and which may be excited by other (particularly galvanic,) stimuli, but which are, for the most part, dependent upon the will. There are certain automatic movements, such as closing the eye-lids to prevent the intrusion of any foreign body, which are instinctive; there are certain others, as in the formation of the voice, which appear to be instinctive, but which are really dependent upon an exceedingly rapid communication of intelligence from the brain: and there are others generally, which are obviously called into action by the will, as in the act of progression, or of taking up any body with the hand: but all these actions are to be ultimately referred to a vital power of contractility. Morbid conditions of this power sometimes occur, producing cramps, spasms, irregular actions, and convulsions, the painfulness of which is but too well known.

It is, however, necessary to distinguish between this contractility, and an irritability which seems to resemble it. I allude to the motions of plants, particularly the sensitive plant, Venus' fly-trap, and some others, which look very much like muscular movement, but

which are not dependent upon muscular fibre, but rather upon a peculiar elastic arrangement of nature's, which we cannot explain. It is, however, clear, that these extraordinary movements of plants possess a very marked analogy with that folding of their flowers, and drooping of their leaves, which we find to be taking place at certain hours of the day during the process of their sleep. This is not arising from the impression of light, as, in some plants, the folding and unfolding of their petals will depend upon precisely opposite states of light. But again, these conditions do not result from muscular fibre; they may be analogous, but they are not identical with it, which, as well as a specific nervous system, are the attributes of the animal kingdom. From resting upon these analogies, and from observing that the iris contracted upon the stimulus of light, and relaxed when that light was weakened or withdrawn, it was long contended, that this contraction was the mere result of irritability and sympathy with the optic nerve. But later philosophers believe this movement to be no exception to the general rule of animal contractility being dependent upon muscular fibre: they believe that the iris contracts when the retina gets too

much light, in order beautifully to exclude the superfluous rays; and relaxes in the weaker light, so as to secure, as far as possible, distinct vision, by obtaining a larger quantity of rays.

CHAPTER VI.

On the function of secretion — Function of innervation — Phenomena of the nervous system — Of nervous sympathy.

BEFORE proceeding to our last great division of animal structure and function, the nervous system, we must shortly advert to the phenomena of secretion. In the course of our former observations, we have mentioned several secretions, as the saliva, gastric fluid, bile, tears, etc.: and on the function of secretion generally, we shall only observe that it seems to be for the purpose of separating from the blood certain fluids, which, if retained, would be injurious to the system,—certain others, which may be employed for useful purposes within the animal economy,—and certain others, which may be of signal service when removed from it. Of these three kinds, examples of the first class will be found in the various excretions of the body; of the second, in the saliva, or bile, or the fluid of joints, etc.; and of the third, in the secretion of milk, which is so necessary to the young animal,

and forms so important an addition to our comforts and luxuries.

These secretions seem also to originate from two distinct sources; the former consisting in the absorption and separation from the body of certain particles, which, if retained, would be injurious to it, and which are, therefore, carried into the mass of blood, and conveyed to the appropriate organ destined to separate them from it: the other source seems to be from a vital process of secretion rather than separation, by which the blood itself undergoes changes in passing through certain vessels—these changes resulting in the formation of the peculiar fluid. Bile may be taken as an instance of the former, and saliva of the latter secretion. How it comes to pass that the recrementitious particles thus associated with the blood, should be separated from it by so small a portion of that fluid as can be distributed by a minute artery supplying the separating organ, we cannot possibly explain, and can only refer the fact to the one great Ordonnance of the first Great Cause, who said, "Let there be light, and there was light."

Still, perhaps it may be asked, How is it, that so great a variety of secretion is arising from one and the same fluid? We cannot explain

this further than by referring to its origin as a vital phenomenon; it does not appear to be at all dependent upon the form or structure of the secreting organ; and it is generally believed that the living membrane of the glands is the true secreting surface. Our present means do not enable us to detect differences of a marked character on these surfaces; yet, doubtless, they do exist; and probably the difference of secretion is dependent upon the original will of the Supreme Creator, by whose omniscience it was appointed that certain vessels and nerves should produce certain alterations upon the one uniform fluid which flowed through and supplied them. This view is perfectly consistent with the great law of nature, which we can observe; since we find that if apples and plums, for instance, of several kinds, or plums of very opposite varieties, be grafted upon the same stem, the apples, pears, and plums, produced from the same root, and the same nutritive fluid, will be precisely according to the graft; that is, that the sap, in passing through their respective vessels, will be so acted upon and modified, as to produce the peculiar fruit of the tree from which that graft was originally taken. This is only another proof that we must receive as

truths, many things which we have no possible method of explaining.

Some secretions appear to be very especially under the influence of the nervous system. Doubtless, secretion will not go on at all, if the nerves supplying the particular glands be paralysed; but in minor changes of nervous influence, secretion will be arrested, or increased by mental emotion. It is perfectly notorious, that the secretion of saliva is arrested by fear or apprehension, while another important secretion is largely increased by the same mental and bodily condition; the secretion of the tears is immediately and immensely augmented by distressing intelligence; the secretion of milk is arrested by any little temporary distress, while it is excited by the presence, or by a thought of the young animal for which it is destined; and an immense secretion of bile is the consequence of violent passion. We have before mentioned, that bile is formed from blood which has already gone the round of the circulation, and we shall here notice only one other of nature's wise provisions. In fœtal life, the size of the liver is enormous as compared with the body,—and at first sight this may appear an extraordinary provision; whereas, on

closer inspection, it only enlarges our notions of the wisdom of God. It is to be recollected, that during fœtal life there is no respiration, and, therefore, the liver is the only organ which is capable of decarbonising the blood. Thus, everywhere do we find, that, in proportion as the boundaries of our knowledge are increased, so are we increasingly taught to admire and to adore the infinite wisdom of Infinite Beneficence.

We now proceed to the phenomena of the nervous system, which will lead us to speak of the senses, of instincts, of sleep, and, finally, carry us on to the consideration of intellectual and moral man.

The great centre of the nervous system is the brain; and its importance may be duly estimated by the fact, that one-fifth part of the whole circulating mass of blood is sent to this organ: thus showing, that the function of an organ so richly supplied with blood, must be one of the first consequence; and accounting for the fact which experience has impressed upon us, namely, the impossibility of continuing its function in an energetic way without a due supply of highly vitalised blood. This observation is probably applicable in an especial

manner to the upper, or intellectual brain:—this portion is termed *cerebrum*, or brain; but there is another portion situated at the inferior and posterior part of the brain, termed *cerebellum*, or little brain, which is connected with the spinal marrow, and which is more particularly devoted to animal life, and should be considered as a prolongation, or extension of the spinal marrow. This portion of the nervous system is shrouded from observation, and protected from injury by the vertebræ of the back; between each vertebra a pair of nerves is given off, and each of these nerves has a double origin; for in the spinal canal there are four columns, two of which are anterior, and two posterior; and each nerve originates in a root from either of these columns, and almost immediately afterwards gives off a twig to the great sympathetic, whose especial office seems to be to provide for the consentaneous actions of the whole of the animal economy. These two roots of the spinal nerves confer different functions, namely, the anterior roots being destined for the locomotive function, and this peculiarity being retained to their minutest distribution, while the posterior roots are equally destined to the function of sensation. Thus, the former

set of fibres convey notices from the brain to the muscles, while the latter convey notices from the body to the brain. This will be frequently seen in a paralysed limb; the nerves of motion (or *vice versâ*) will alone be paralysed, while the acuteness of sensation may be actually increased.

Formerly, the brain was supposed to *originate* all the nerves; but it is now more correctly understood to be their termination; by them is derived the perception of all external impressions; by them communications are made to certain instruments of action; and by them is given that internal impulse to movement which constitutes mental phenomena. Through the medium of the nervous system, more especially of the senses, all knowledge is obtained. This knowledge is communicated to the brain, and elaborated by it, so as to fulfil all the functions of the animal; and it will be found as an invariable rule, that the development of the brain is exactly in proportion to the mental position which has been assigned to its possessor: thus showing that the all-wise Creator has furnished his creatures with all that is required for their well-being; and that results are expected precisely in proportion to the talents which have

been conferred—to the brutes, instinct and instinctive brain;—to man, reason and instinct, together with instinctive and intellectual brain. Thus clearly is it seen, that it is not the brain which makes the animal, but the destined position of that animal which has acquired such an amount of brain with a proportionate amount of responsibility.

Thus have we seen, that there are nervous tissues adapted to motion and sensation; but the question presents itself, wherein consists that nervous action, which precedes and occasions such motion and sensation. Now, as in all other unknown and uncertain matters, so also in this, the effect has been attributed to the transmission of a nervous fluid, to vibrations communicated from one extremity to the other, to electricity, etc. All these have been supported with a certain degree of plausibility; it has been asserted that the nervous fluid has been demonstrated, and we would by no means deny its existence. But in the present state of our knowledge we would say, the fluid has not been rendered palpable. We would assert that the theory of vibrations is very unsatisfactory, because there must be an inconceivable variety of these vibrations for every peculiarity of sen-

sation, and for every notice sent to the obedient organs; and although nervous influence and electricity possess many analogous features, yet it is clear from recent experiments, that they are not identical in their nature. We must, therefore, admit that the essence of nervous influence remains as yet concealed from our view, and we must be contented to study its phenomena without as yet assigning them to a specific cause.

With regard to the action of the great sympathetic nerve, which has been already noticed, it should be remarked that it has no determinate origin, but collects its twigs from every quarter, and derives its notices from the whole system. It is not at all under the influence of the will, and seems especially devoted to forming the bond of union with all the nerves of organic life; and to give immediate notice of any derangement in the animal economy, so that by exciting the attention of the intellectual nerves, it might be considered and remedied.

Thus, then, by means of the nerves, a communication is maintained between all parts of the fabric to which they are distributed, and certain central organs of sensation or action, namely, the brain and spinal marrow; and these,

again, are intimately communicating with the functions of interior life by means of the nerves of the visceral, or gangionic system, thus weaving the whole into one continuous system of beautiful harmony of action and passion—of doing and suffering—of sympathy and antipathy—of conservation or destruction. We are confessedly ignorant as to the precise mode in which this is effected; we can only say that the entire result seems to be produced by the repeated interchange of fibres, by a number of *plexuses*, or networks of communication, in which many branches intertwine, communicate, and again separate; by the universal agency of the great sympathetic nerve, and by the establishment of little organs called *ganglia*, which seem to act as lenses with the power of re-duplication. Thus united, the functions of the nervous system may be again sub-divided into—

1. The reception of external impressions, of which those transmitted to the sensorium give rise to corresponding and specific sensations.

2. The origination in the nervous centres, and propagation along the motor trunks of nerve, of an influence which stimulates the muscles to contraction in obedience to the will,

and produces locomotion, and other voluntary changes.

3. The operations of the mind, which are excited by sensations, and which, to produce any action upon the corporeal system, must terminate in giving rise to motor influence.

4. The establishment of a communion between the organic functions, by which the vital actions are brought into correspondence and harmony with one another, and are influenced by certain mental conditions, producing instinctive action, such as swallowing from the presence of food, or contraction of the pupils, from the presence of light, etc.

5. And in man, intellectual man, the brain being the centre of the nervous system, perceives impressions, considers their nature and extent, compares their respective value and peculiar bearing, judges of their relative importance, determines upon the line of conduct to be pursued, and issues its orders in conformity with the will, to the several parts of the body under its immediate direction.

The mind of man influences his corporeal organs, through the instrumentality of this system, as often as volition or emotion excites them to action; and on the other hand, certain

changes in the bodily condition will affect the mind through the same channel, as when impressions made upon the body excite mental perceptions. In this way, the nervous system becomes the grand link of communication for maintaining what has been called the life of relation ; or that which reciprocally connects every one organ with every other individually, and with the whole collectively. It is obvious that, were it not for this mutual dependence, the whole would immediately go wrong.

It is to be remarked, however, that the nervous system can act independently of the mind. Under a variety of circumstances we see this to be the case, though we cannot explain the cause. We see one set of nerves excited to action by the disturbance of another set of nerves, the latter being a consequence of some purely organic cause. It is, however, to be remarked, that these simply nervous agencies are entirely independent of the will. Nothing more clearly designates the superiority of man over every other animal, and that this superiority is mainly conferred by the gift of mind which he possesses, than the difference in the actions of the two nervous systems ; the one purely physical, and limited to the instincts and

sensations of brutes, the other giving manifestation to the intellectual powers and moral faculties, inclinations, and dispositions.

In every ordinary voluntary action, the germ of that action is a mental change, in which consists the act of volition. The mind oftentimes produces this change in itself; in which case, the result is thought, desire, inclination, and as yet this has no reference to the body; but if upon this thought, desire, or inclination, there is to be grafted action, then the influence of the will has to be directed to certain muscles, and a contraction of these muscles ensues, in such order, and with such a degree of energy, as to produce the desired effect. Thus the mind may think, or even act in thought, within itself, but the bodily movements which are necessary to develop these thoughts into overt actions, can only be accomplished through the influence of the nerves.

It is not intended to be asserted that this mental change, constituting the germ of volition, or that mental thought of any kind, can be independent of a material change in the fibres of the manifesting organ: such is the mysterious union between mind and matter, that there can be no question, but that every mental change

produces a corresponding change upon the cerebral fibres; all that is distinctly asserted is, that there is mental change constituting the first link in the chain of human action, followed by corresponding change of cerebral fibre, communicated to such portions of the nervous system as may be required to complete action.

On the opposite side of the question, if an impression be made upon any of the nerves of sense, this impression is conveyed to the mind by the extension of those nerves to the sensorium, and cannot be thus produced, if the continuity of those nerves be destroyed. The mind may be capable of developing the idea in itself, but it cannot derive it from any special cause or impression except through the medium of nerves. Thus the skin may be pinched, but if the nerves of that tissue be destroyed, then there will be no sense of pain; light is admitted to the eye, but if the optic nerve be paralysed, no corresponding idea will be excited in the mind, although it be capable of originating in itself the ideas of pain and of sight.

In these two opposite states, the indispensable necessity of the nervous system is apparent; in the former case, a wish may be produced in the mind, but it is inoperative unless conveyed

to the body through the will; and in the latter, an impression may be made upon the nerves of sense, but it is useless and equally inoperative unless conveyed to the mind. In both cases, therefore, nervous action is produced; in the one, from the mind to the body, in the other, from the body to the mind; and in both, the absence of integrity in the nerves altogether destroys the action. Of the nature of this connexion between mind and body, we are altogether ignorant.

It has been supposed, that the mind can produce a direct action upon the nerves besides that which is accomplished through a distinct voluntary effort. And it has been instanced, that the sudden and uncontrollable movements under the influence of strong emotion, and that the expression of the countenance varying under the influence of different passions and affections and emotions, are independent of the will. That the most astonishing muscular movements are made under the operation of fear; and that the countenance does most accurately describe the workings of the interior mind, none can doubt; that nature has given to the countenance a number of muscles for the sole purpose of expression can be anatomically demonstrated: but

we are disposed to believe, that the effect produced in all these cases is really voluntary: the extreme rapidity of the movement, on the one hand, and the infinite variety on the other, seem to be the only reasons for doubting this explanation. But surely neither the one nor the other is quicker or more diversified than thought, where there can be no appreciable interval between the cause and the effect. Every body is conscious that he can of his own will give certain expressions to the countenance, and restrain certain others; and in this consists the hypocrisy of the world; they pretend to the possession of feelings and sentiments which are perfectly alien from their bosoms; and they can feel to the heart's inmost core, and yet not suffer that feeling to influence the muscles of expression. Again, these muscles are called into fictitious action on the stage, and the reputation of the actor is dependent upon his successful imitation and expression of the passions of mankind. Consequently, these actions may be produced by the will, and it is, therefore, reasonable to believe that they are so produced. In proportion as these actions are frequently repeated, certain muscles gain strength and fulness by reiterated employment,

and give to the countenance that expression which it is most frequently called upon to portray; and so we meet with the expression of benevolence or of its opposite, of candour or intrigue, etc. etc., and this forms the groundwork of the science of physiognomy, a science whose acquaintance is to be sought after, not in the possession of any arbitrary rules, but in the experience and observation of nature upon a large scale.

There are some other actions of the nervous and muscular systems, which are purely independent of the will, or of any other mental change; these are simply instinctive and automatic, as in the acts of swallowing or rejecting food, in closing the eye-lids to save the eye itself from intrusion, or the contraction of the pupil from too strong a light, or the acts of sneezing or coughing, in all which, though the mind may be conscious of the application of the stimulus, yet it has nothing to do with the secondary phenomena; nor can it generally prevent them by any effort of the will.

Of this class of sensations are the breathlessness of intense listening, the palpitation of the heart from suspense, the thrill which creeps over the whole body from the emotion of joy

the shuddering which arises from a sense of danger escaped, the chattering of the teeth and goose-skin which belong to fear, and the choking sensation which attaches to the deepest grief, all of which are to be found in different persons, according to the nature of their individual temperament, and according to the nature and intensity of the impressing cause.

Such is the reciprocity between mind and body, that while mental states do produce these indirect and involuntary actions; so also will an exterior impression often give a prevailing tinge to all our thoughts and feelings, and according to the degree of this impression, shall we be mirthful or sad, hopeful or desponding. Thus, in the world, we find the man of feeling acting upon the impulse of the moment in a way that his reflective judgment utterly condemns; we see one man looking through a darkened mirror at mankind, surrounded by enemies, by those who would injure him if they could, and suspicious of every one; while another finds a friend in every companion, extracts hope for to-morrow, even from the failure of to-day, trusts everybody, and believes that all the world is benevolently interested in his individual success. And these are physical

conditions, which require to be controlled and modified by mental principle and motived discipline.

We cannot attempt to explain, wherein this nervous power consists, or the reason why it is the agent for carrying on thought in the intellectual brain, for developing muscular movements in the locomotive functions, or regulating, controlling, and harmonizing the functions of organic life: or why nervous power produces digestion in one organ, assimilation in another, or respiration in a third. These things are inexplicable: but we see that so they are; and we can constantly witness that too large an expenditure of nervous energy in any one particular direction, will impair the vitality of the entire system. We shall mention but two opposite instances, the intellectual man, and the labourer; the intellectual man spends too much nervous energy over his studies, and becomes fatigued and exhausted, his muscles are enfeebled, his digestion bad, his nerves irritable, his sleep feverish and disturbed, his emaciation is marked, he is gradually unable to work, and ultimately falls a victim to overgoaded brain. Not after the same rate perhaps, but still after the same manner, the labourer who

rises early, and late takes rest, and who exhausts his muscular energies, is one whose intellectual brain is generally limited in its development, but who also gradually wears out his powers, and dies the victim of too great muscular action: in either case the undue expenditure of nervous energy being the remote and immediate cause of the evil. The lesson to be learned from these facts is to be moderate in all pursuits however lawful, and even praiseworthy, to avoid excess of every kind, and yet to be industrious; for the absence of a sufficient expenditure of nervous power is equally fatal to its well-being. In this case, oppression and congestion take the place of irritability and exhaustion, and by a different route the victim is conducted to an ignoble portal of existence, from which he departs unregretted, unnoticed, and unrecorded.

One word on the subject of nervous sympathies will close this portion of our subject. These appear to be of three classes: sympathies between different individuals; sympathies which affect the mind, and through it the body; and sympathies which are purely and exclusively corporeal.

Of the first class of sympathies, though it

is impossible to deny their existence, it is equally impossible to explain them. The general and immediate feeling of sympathy and antipathy between persons who have never met before, the volumes of history, the years of feeling, the depth and variety of expression and emotion which are revealed and told by a grasp of the hand, or a glance of the eye: the extent to which one nervous system may act upon another in the magnetic state, are all undeniable proofs of the existence of this sympathy; and we shall be contented to announce the fact, without attempting to reconcile discordant opinions, as to whether the influence be direct or indirect, through the medium of imagination: it does, however, appear to have been produced in cases where the agency of imagination was impossible.

In the second class of sympathies, an affection of the mind is an indispensable link in the order of causation: but we are equally unable to explain why this affection should produce that effect. Thus, for instance, we shall find that one impression made upon the olfactory nerves will produce a secretion of saliva, and immediately excite all the preliminaries of appetite and digestion, while another impression upon

the same nerves will produce fainting. We cannot attempt an explanation: let us be content with recording their existence, and admiring where we cannot understand; at the same time, deploring that man's capacities are so limited, and that he limits them still further by his prejudices.

The third class of sympathies admits of explanation from the established connexion between the nerves of sensation and of motion: and if we will take the trouble we may trace anatomically the successive links which lead to the expression of organic sympathy; but this would be a subject not suited for popular readers, and for the same reason we pass over the actings of morbid sympathy, or sympathy created by disease, a subject all-important to those who study disordered functions, but undesirable for general discussion.

CHAPTER VII.

Of the Senses—Sight—Touch—Taste—Smell—Hearing—Of Sleep.

We now pass to the consideration of the *senses*. These are sight, smell, taste, touch, and hearing. These are the great inlets to knowledge, the grand routes by which information reaches the mind; and, as such, their intellectual employment is of the first importance. But the senses act also as sentinels to preserve the constitution from physical harm, to inform it of approaching danger, and to awaken it to the employment of the means of self-preservation. The senses are also useful in the conservation of the animal economy, and excite us to the agreeable performance of those functions by which its integrity is maintained.

With regard to the sense of sight, the human eye and its appendages would afford materials for an entire volume, so that we can only give a superficial sketch. It will be noticed in the first place that there are two eyes; not that

more than one is necessary for distinct vision, but probably for the beauty of appearance, and especially that in the event of one organ being lost, total blindness should not be the consequence: and it has been most wisely appointed, that though the organ be double it produces only single vision. The eyes of animals generally are placed on the side of their faces, and some of them so far back as to give them a posterior field of vision; but this does not seem to have been required by man, whose eyes are placed in the front of his countenance. The eye is a peculiarly delicate organ, and the greatest care has been taken to preserve it from injury. It is protected first by the overhanging eye-brow, which serves to intercept bodies which might otherwise fall into the eye. Again it is defended by the eye-lashes, which serve to prevent the access of extraneous bodies; and the eye-lids are furnished with such muscular power, and such instinctive or automatic nervous action, as to close immediately, and to prevent the intrusion of foreign creatures or substances. Then the surface of the ball of the eye is kept constantly moistened by a secretion of tears which preserves its free and easy movement, and also

helps to wash away any extrinsic body which may have intruded. Without this secretion and this protection it is found that blindness is an early consequence of exposure.

The eye itself is composed of several coats and humours, of which, however, we can only mention, in this place, the transparent cornea, which admits the rays of light, and the choroid coat, which absorbs all the superfluous rays, namely, all those rays which would render the picture upon the retina indistinct. The rays of light pass through the cornea into the aqueous humour, and receive in their passage, a certain degree of refraction, which only tends more thoroughly to concentrate them upon the *crystalline lens*, the office of which is to collect and arrange the rays in their proper focus, in order that they may produce the picture of their object upon, and not behind, or before, the *retina*, or expanded optic nerve. The rays thus concentrated and arranged now pass through the vitreous humour, where they again experience a certain degree of refraction which perfects their convergence, so as to form their picture accurately upon the retina—this communicating immediately with the brain. There is in this process a most beautiful

arrangement: this impression is not made upon the *trunk* of the optic nerve, but upon the expansion of its terminal surface, and, therefore, the entrance to the optic nerve is not precisely in, but to one side of the axis of vision. It is an established fact that it is not the trunk but the extremity of a nerve which constitutes its sentient part; so it is in the present instance, and so it is therefore that the trunk of the optic nerve is removed from the axis of vision, and the picture is made upon the retina or expanded extremity of that nerve. Partial paralysis of this nerve, or various states of irritation of the organ, will produce the appearance of ocular spectræ, and give rise to optical illusions, which will occasion many uneasy sensations, and sometimes form an easy method of explaining the history of apparitions. It has been also shown by the recent experiments of Reichenbach, that many of those histories which have been treated as fabulous, or have been explained as optical illusions, as well as many magnetic phenomena, have actually a foundation in the natural history of science. It is a curious fact that the picture produced upon the retina is an inverted representation of the object, and yet we see it in its proper or

upright position. Many theories have been adopted to explain this phenomenon, but they are unnecessary, for they only remove the difficulty one step further backward. We have thus traced the rays of light given off by luminous bodies till we have got the inverted picture impressed upon the retina, but we can go no further: we cannot say why, or how, the brain perceives this picture, and we must refer it to a primeval law of the Creator. We can see the beautiful design, we can trace its agency, and follow its successive footsteps to a certain distance, but we are then lost in immensity, because we have reached the confines of finite knowledge, and have approached as nearly as we can to the footsteps of Infinite wisdom, power, and love!

In passing over this sketch we have not noticed the function of the iris, which admits a large number of rays, or only a very few, according as the light is strong or weak, and according to the sensibility of the retina. This power is more fully possessed by animals which catch their prey by night, as, for instance, the domestic cat, and the whole feline tribe. In a strong light, her iris gives but a mere slit of aperture; but in a weak light, she has a largely

dilated pupil, capable of admitting a great many rays. This same power is discoverable in the human eye, as, for example, by going instantly from a strong sunshine into a moderately darkened room, when everything appears actually dark:—yet all this is superseded in a few seconds, and again objects appear sufficiently enlightened.

We have not yet mentioned the power of the eye, especially by its muscular arrangements, to accommodate itself to different distances and positions: this exists in the human eye, but is more particularly exemplified in the eagle, the falcon, and other birds of prey, which possess an extraordinary power of adaptation of the eye, to sight at great distances. The beautiful structure by which this effect is produced, is not explicable to general readers; nor is it possible to calculate the distance at which birds of prey are enabled to descry their victims, or to institute a comparison between their ordinary field of vision and that of the human eye; it is enough to know, that, by an anatomical arrangement, they possess this power, in order that we may admire the footsteps of Infinite Wisdom, as displayed in the adaptation of structure to function. The power of the horse

to retract the eye within its socket, in order to save it from injury, is another example of the same law.

The degree of enjoyment which we obtain as rational and intellectual beings through the eye is very great. By it we revel in the beauties of nature, which have been so all-bountifully strewed around us; by it we investigate the structure and formation of the various productions of life; through it we form an intellectual acquaintance with the past, and dive into the future; by it we search out the hidden treasures of wisdom and of knowledge; by it we determine the route of our own locomotive conduct; and by it we investigate through the countenance, the character of those with whom we are placed in contact, and we obtain lessons for our own safety and guidance. And when we look to the use which man has made of his eye, and the machines which he has invented, arising out of his knowledge of this optical structure,—and when we estimate the wonders unveiled by the telescope and the microscope, our minds are filled to overflowing with the wisdom and the goodness of the great Creator.

With respect to the sense of touch, it is, perhaps, that which gives us the largest amount of

animal pleasure which we obtain from any one sense. The perfection of the sense of touch resides in the hand, and especially in the extremities of the fingers. Of course this is to be referred to the sentient extremities of nerves which supply the true skin; and the cuticle is placed over it to protect and preserve those nerves from the otherwise harsh impressions which would be made upon their denuded sentient extremities. The hand forms a most extraordinarily sensitive organ, and it is impossible to appreciate the amount of information which may be conveyed by the tips of the fingers; nor is it easy to estimate the true value of such intelligence. It should be remarked, that this sense, like every other, admits of cultivation and development; and that the extent of the information acquired through its agency, will be in proportion to the attention which has been bestowed upon it, the diligence with which observations have been accumulated, and the importance of the subjects upon which it has been employed.

We pass on to the sense of taste, which seems to be a modification of that of touch—since the sapid body must be applied directly in contact with the sentient extremity of the peculiar nerve

devoted to this purpose. Still it is a peculiar nerve; for the nerves of touching will not give the sense of taste; neither will the tongue at all supply the place of the fingers. As with the other senses, so taste forms a safeguard from the intrusion of deleterious substances, — although man, in his unhappy sophistications, has degraded this sense into one of the most grovelling enjoyment; and has debased its fine and delicate perception into an organ of the most disgusting gluttony. This, however, is the abuse—not the use of the organ; and is a consequence of that grievous perversion by which every originally good endowment of man's nature has been corrupted and alienated from its original design, and prostrated before the government of the most tyrannical and the most desolating usurpation. The principal organ of taste is the tongue: and this sense resides, for the most part, in certain little papillæ, which are chiefly situated at and near the tip of the tongue. These papillæ are capable of excitement, and present to the object to be tasted the fine extremities of the gustatory nerve They do not exist at the back of the tongue so that persons really anxious to avoid the disagreeable taste of what they may have to

swallow, may greatly supersede that impression by conveying the substances at once to the back of the mouth, and by swallowing them instantly.

It is a curious and beautiful display of the resources of nature, that the tongue is a double organ; and that while it performs the function of the sense of taste, it is also the principal organ of speech—a subject which our plan does not admit of being entered upon.

The sense of smell is a decided adjuvant to that of taste, insomuch that the acuteness of taste is very greatly increased by drawing in the air through the nose, and obtaining the assistance of that sense in distinguishing tastes; and also that the sense of taste is greatly impaired, and almost destroyed, whenever that of smell has been materially diminished. Like all the other organs of sense, it is dependant upon the expansion of its peculiar (the olfactory) nerves, upon the mucous surface of the nose; and by it are appreciated the odoriferous particles which are given off by different bodies. The amount of quiet pleasure conferred by this sense, in addition to its perfecting that of taste, is extraordinary; and an estimate of the beauties of the floral kingdom is very greatly

assisted by it. At the same time, it is to be remarked, that these nerves act as sentinels to the air passages, to protect them from the intrusion of any deleterious quality. In effecting this purpose, it will be observed, that the olfactory nerve is not confined to odoriferous bodies only, but that it is also a nerve of common sensibility. Any person may appreciate this fact by merely tickling the inside of the nose with a feather:—there is no smell, but the sensibility excited is intolerable. So also with regard to any irritating substances which have no smell, the amount of irritation is so great as to excite the associated action of the respiratory muscles, and by a violent effort of sneezing to expel the intruder from its unhappy locality; the good effect of this double function is too obvious to require notice.

Lastly, the sense of hearing, with its appropriate organ, the ear, claims our attention. It is impossible to enter upon an explanation of this delicate and complicated mechanism, which would be incomprehensible without lengthened detail, and without the aid of plates. Suffice it, therefore, to say, that sound, which is the object of this sense, is propagated by atmospherical vibrations, and cannot be so propagated in a vacuum,

that is, where there is no atmosphere to receive and convey it; that these vibrations or impulses are gathered together by the beautifully formed and arranged external ear; that they are concentrated and conveyed to the membrane which is called the drum; that the vibrations thus received, are propagated to some exquisitely minute and beautifully formed little bones in the middle of the ear, which probably increase and define the sounds, and conduct them to the wondrously constructed internal ear, and to the auditory nerve, by which they are received, and through which the perception and distinction of sound are communicated to the brain. It is a curious fact, that the admission of air to the internal ear, seems necessary to the sense of hearing, and this is provided for by a tube, called the eustachian tube, which passes from the throat: and if this tube be closed, as it is sometimes from cold, temporary deafness is the consequence, till this route has been re-established. There is, too, a great difference in the ears of different persons: there is, in the first place, the dull and the sensitive ear—the one alive to every impression—the other allowing considerable impressions to pass unheeded and unawakened; and this, too, not originating

from a fit of abstraction, which severs the individual for the time being from all ordinary communication with the external world. But there is also a musical, and a non-musical ear—the one alive to all the enjoyments arising from the combination of sounds—the other deprived of this enjoyment: the difference being altogether independent of that cultivation which will do a great deal for a defective organ. Whether this defect may be accounted for by some original constitution of the auditory nerve, by some inaptitude of the sensorial system, or by a want of fulness in some supposed organ of tune, we are not disposed to discuss, but simply to record the fact.

Having briefly noticed the organs of sense, we must pass on to a phenomenon, the periodical visitation of which, is required by each of them respectively, as well as by all the other organs and functions of the body, in order to preserve them in health, namely, sleep. Every one is acquainted with the blessings attendant upon "tired nature's sweet restorer, balmy sleep;" and almost every one has felt the misery consequent upon its absence. It is difficult to define wherein sleep consists. We may say that it is a period of rest, which is common to

all animated nature—to plants and animals, as well as to man: it is, therefore, common to beings which have, and which do not possess, a nervous system;—so that any explanation of the phenomena of sleep, proceeding upon the supposition that it is a pure product of the nervous system, will not be satisfactory. Nevertheless, that which we understand by the general term *sleep*, is manifestly connected with the nerves; the necessity for sleep is produced by exhaustion of the nervous system; and by sleep its energies are recruited; still we are utterly unable to say wherein it consists As the usual period of retiring approaches, everybody is conscious of the invasion of drowsiness; sleep is required in proportion to the preceding expenditure and the consequent exhaustion of nervous energy; and by sleep this nervous energy is restored, so that in the morning we rise with a consciousness of energy and alacrity, and a capacity for exertion, which forms a happy, but a strange counterpart to the feelings of the preceding night.

It is, however, a remarkable fact, that it is impossible to define the quantum of sleep which may be sufficient to produce refreshment. Different individuals require more or less sleep

in order to wind them up,—either because different individuals are more or less easily exhausted, or because their brains admit of being more or less readily recruited. Let a lesson of charity be learned from this statement of facts, by those who sleep little, in favour of those who sleep much. If your system should be one of those so happily constituted, that a small allowance of sleep will secure this refreshment, blame not your less happy neighbour, nor accuse him of indolence, because he requires more hours appropriated to sleep than yourself. Like everything else in this dependent world, sleep is a boon which admits of misapplication, and which may readily be perverted into a great source of self-indulgence: but still, among all classes of persons, the hours of sleep must vary individually.

There is a something very surprising in the effect which sleep has upon the brain,—that is, a very little sleep. Thus the system shall have been worn out by continued watching, and sleep shall have invaded it voluntarily or involuntarily; the duration of that sleep, in the instance referred to, may not have been many seconds, certainly not many minutes, and yet the sleeper shall waken up with recruited

energies, and with the power of going on again for some time with whatever had been the previous object of pursuit.

True, indeed, that this brightening of the faculties by a few seconds of sleep, will not long endure, and that another similar act of forgetfulness will be soon necessary; yet, by these little naps, continual watching may be persevered in for a long time without injury. Under these circumstances, the individual is easily aroused: but it seems that, if this sleep goes beyond a few minutes, so as to become deep sleep, then the sleep must go on till the brain has secured its nightly amount of refreshment; or the waking person has an aching head, and an unconquerable disposition to drowsiness. From this, it would appear, that sleep produces two influences upon the brain; first, *direct* upon the nervous system, thus brightening all the faculties; secondly, *indirect*, involving especially the blood-vessels, and producing a certain degree of congestion of the brain, which can only be equalized by a prolonged slumber. This reasoning is borne out by the fact, that, if an individual sits up for a whole night, he is preserved brilliant through the following day by a few seconds of sleep;

but let him sleep well and soundly the succeeding night, he gets up with headache, listlessness, and a feeling of indescribable misery; in fact, with congestion of the brain, and a lost balance in the circulation, which is only re-established by exertion during the day, and by another night's rest. Having said thus much on the liberality required towards those who sleep much, perhaps there may be some apparent inconsistency in the remark, that in a general way, all people sleep too much, and that they would be better and brighter if they had less sleep. There are persons who seem to be scarcely ever awake — who are almost always torpid — whose faculties are never aroused to acute perception or reflection—never employed on comparison or judgment—and who appear to be never more than half awake. These are composed of two different classes; the first, persons who have been endowed with torpid brains; the second, they who, from education or habit, have adopted this dreamy state as a substitute for thought.

There is much difference in the kind of sleep of different individuals; the labourer, for instance, fatigued with his daily toil, retires to his unbroken, his child-like slumber of six or seven

or eight hours, and gets up refreshed for his succession of duties, while the literary man equally exhausted, but in a different way, retires to bed, but not to sleep, and then to broken and disturbed slumber, and gets up in the morning unrefreshed, with an aching head, a fevered skin, and a listlessness and misery, which, however it may be shaken off by a fresh excitement of the brain, is only a decided proof, how far the intellectual organ has suffered, how much more it has sustained than it is equal to, compatibly with its non-exhaustion.

It is a curious phenomenon, how, under certain circumstances of stimulation, the brain accommodates itself to intellectual exertion, and will go on for a considerable time, with little or no apparent injury. This may be borne for a while, but ultimately it is sure to tell upon the health, and the nervous system gives way somewhere, either in the brain itself, or in some of its dependencies of organic life.

CHAPTER VIII.

Of disturbed sleep—Dreams—Instinct—Varieties of character—Phrenology—Connexion between body and mind—Materialism—Influence of scientific pursuits.

THERE are also various forms of disturbed sleep, which we can only glance at, as dreams, nightmares, feverish visions, somnambulism, delirium, and insanity: these are oftentimes the consequence of a primarily disturbed brain; and at other times are only the secondary results, arising from the irritated function of some uneasy organ, an organ which probably exerts a peculiar influence upon the sensorium, and by which, in a more advanced state of our knowledge, a classification of dreams may be hereafter effected. In order to its being refreshing, sleep should be so light as to be easily broken by the slightest noise, or change of external circumstances, and it should not be prolonged beyond that varying individual period, which is necessary to secure the restoration of the exhausted nervous energy.

If it be not light sleep, or if it be too prolonged, the same effect is produced: the vessels of the organ become loaded, congested, the organ itself is oppressed, and a sense of weariness and feebleness is the result.

Before quitting the subject of sleep, one very frequent and very remarkable characteristic of dreams must be mentioned, that is, an entire forgetfulness upon awakening of that which has most deeply interested us when asleep. That this state is peculiar, is manifest from the fact, that, if the circumstances had happened to us when awake, it would have been impossible to have forgotten them for years, if ever; whereas, although during sleep we have felt more acutely, and the impression has been apparently deeper, it has entirely passed away with the first waking thought. In this respect dreams have a remarkable affinity with the acts and thoughts and words of magnetic somnambulism, which, however characterised by cerebral exaltation during the magnetic state, is followed by complete oblivion as soon as the patient is awake. Another equally curious coincidence is, that these things will be recalled in a future state of magnetic sleep, just as dreams often are; and though we are

conscious during that dream of having passed through all its phases before, yet all is absolutely forgotten again immediately on awakening. Perhaps these striking peculiarities may, at some future time, assist us in the development of these coincident, but equally obscure and unknown phenomena.

A few remarks on instinct must close our review of the purely physical relations of men, and will form the natural link between animal and mental endowment. What, then, is instinct, and how is it to be explained? Our friends, who trace up everything to organization, must be driven to contend for this phenomenon as organic, and yet it is manifestly not so, for with the same organs we have peculiar and even opposite instincts in different animals. Let this be exemplified only in the feathered tribe, and in the different method of construction of their nests. We will admit that one instinct teaches them to provide for the reception of their young, and that this may be organic; but what is it which makes them provide so differently, and why is it that each class has a mode of building peculiar to itself? This is not learned by imitation, because the young female of the present year has had no

means of witnessing the construction of the nest by her parental bird; it cannot be organic, and must therefore be explained in a different way, and that only rational way is, that God has endowed all his creatures with powers suited to their relative position in creation: and that to him and to his gift must be traced all those peculiarities which we cannot explain or comprehend. He it is who has given wisdom to the ant, who has taught the bee the most scientific form for its cell, has given peculiar laws to every individual department of animated nature, and doubtless always such as would be most conducive to the general welfare. We cannot, perhaps, trace the causes for these varieties; indeed, of what can we thoroughly trace the rationale? Be it ours to admire and to adore, and not impiously to deny, because we cannot understand. By this principle alone the animal is guided and governed; by this its powers are limited, and to this all its actions are ultimately to be referred. An animal cannot progressively improve: it is as it was from its earliest origin: it can discover nothing new, it can lose nothing old; forgetfulness and acquisition are equally alien from its structure, its habits, and its position; the

beaver and the sparrow are now as they have been from the creation, and as they ever will be; and here is the great distinction between reasoning man and instinctive animal.

Man has but few instincts, but he has another principle termed reason, to which even his instincts are subjected, and which enables him to look back upon the past, and forward to the future; to reflect and to anticipate, to form new designs for the success of to-morrow from the failures of yesterday. Hence man is responsible for his conduct, and for the employment of his powers; but animals are not so, because the most highly gifted do not possess reason, do not possess the power of looking within, or of looking back,—in fact, do not reflect, do not discriminate, do not compare, do not judge, do not determine.

Now in man there are great varieties of character and of temperament, and the latter so influences the development and expression of the former, that the main points of character may be known from becoming acquainted with the peculiar temperament; and these varieties of character are as frequent or nearly so, as of instinct: but we have not room to enter upon these so marked characteristics

We have said that they are dependent upon temperaments, and temperaments are arising from physical peculiarity, and, as was the case with the instincts of animals, so must we trace back these peculiarities to the gift of Him who dispenses to every man severally as he will, who bestows talent in very different proportions, but who measures responsibility according to the talents given; who requires from each an account of the stewardship entrusted to himself; who expects that the single talent should be employed and improved, and who dispenses a proportionate reward to the possessor of five as of ten talents. By analogy it may be presumed that there will be also a proportionate punishment attached to the neglect or abuse of great talents; but on this point we have not so certain scriptural guide. But it should be most strongly impressed upon you, that you are responsible for your own powers. Let no man fancy himself exempt from this law, because his gifts or his advantages have been few; he is equally, though proportionally, responsible: every man is responsible to his Maker for the employment of his whole powers, be they large or small, and is equally guilty of abusing or neglecting those powers as far as

they go: though, doubtless, the greater the gift, the more serious the responsibility involved in its right employment. And having premised thus much, we proceed to a consideration of the questions involved in phrenology.

It would be unjust to my readers not to notice doctrines, which, of late years, have been put forward with a degree of almost unequalled consequence, claiming for their sole origin and foundation a certain number of facts. No right-thinking person can doubt that the brain is the organ of mind; and whether it be *one* organ capable of performing the several varieties of one great mental function, or whether it be a tissue of small organs, individually attached to each, one of these several varieties of mental function, (as well as their antagonists,) cannot in itself be of much consequence. It is from the moral inferences which have been deduced that it becomes important.

No reasonable person can doubt that the brain is the organ of mind, or that the cerebral fibres are devoted to the manifestations of mind; every one, therefore, must be, to a certain extent, a phrenologist; and the question is not so much as to the truth of phrenology, but as

to whether the present system of phrenology be the truth; and whether its general doctrines be in conformity with facts and sound reasoning. And these premises being admitted, it becomes a question, whether the said doctrines, established as true in themselves, may not have been perverted and misapplied so as to produce serious errors and consequences of a painful nature.

The present system of phrenology is held by many excellent persons, who feel thoroughly convinced of its truth—and doubtless there are some very strong facts in support of these convictions. There have been some most striking results arising from the application of the present system, but there have been some grievous failures; and it is clear that the truth of the system can alone be tested by a regular classing of all the failures, and by a final comparison of the successes and miscarriages of its professors

It is useless to say that these are the errors of the professors, and not of the system, because the same argument admits of application on both sides; and the successes of phrenology may be as much dependent upon the acquired knowledge of a good physiognomist, as its errors may be dependent upon the want of knowledge

in a phrenologist; consequently this cannot be admitted as conclusive argumentation.

Then, again, it is manifest, that the successes of phrenologists may be dependent not simply upon their physiognomical skill, but also upon the coincidences which we often find, and which give the appearance of consequences to events and actions which have no necessary or real relationship to the antecedents.

Another important consideration is, that the present system of phrenology places all the known organs, involving the manifestation of all, or very nearly all, mental character upon the superior surface of the brain. Now, admitting, as we do most fully, that the brain is the material organ of the immaterial mind, it does seem to throw some doubt on the present system of phrenology, when we find that, according to its arrangements, all the lower portion of the brain, probably one-half of its substance, should be unappropriated, because we cannot perceive an adequate reason for the formation of so much unemployed cerebral fibre.

The first question to be asked, is, Are there no organs in the unmapped portion of the brain? If there be none, how comes it that so large a portion of cerebral nbre should have

been created uselessly? for it is uselessly, upon the supposition that the brain is sub-divided into small individual organs and compartments.

And secondly, if it be admitted that there are no organs on this large surface, how is their absence to be explained ? ow is it that it can be assumed, on the one hand, that the brain is divided into small organs, and yet that one-half of it is not so divided, or that it is left for the allocation of other organs ?

If the present allotment of organs be correct, none are left for the inferior periphery of the brain; and if some of the present superior organs are erroneously placed, and ought to be located elsewhere, then the present system of phrenology is too imperfect to admit of being implicitly received.

These doubts are only applicable to the present system of phrenology, not to phrenology itself.

And it is distinctly stated that the present system is most conscientiously and most innocently held by many of the wisest and the best, while it has been employed by others in support of many erroneous views, and conclusions of an immoral and irreligious tendency.

So long as it is a mere matter of scientific speculation, whether the one or the other be the correct explanation of the cerebral faculties, so long is it a matter of perfect indifference to society ; but when it comes to be asserted as a necessary consequence of phrenology, that we are not answerable for our conduct ; that we are, in moral development, precisely what our organization makes us, that we cannot help being wicked, if we have wicked brains given to us ; and that we ought not to be punished for our offences against society, against the laws of God and man, then it is that it becomes a duty to enter a caution against the evils which result from speculative error, if it be such, or from the misapplication of speculative truth.

One of the great strong-holds of phrenology is derived from the fact that the degree of cerebral development in the lower animals is precisely in proportion to their intelligence. Unquestionably it is so ; but this is equally to be accounted for by the quality and quantity of a single brain, as by the multiplication of organs; and is in itself only a proof, that each animal has been especially designed for the situation it has been intended to fill in the grand scale

of animated nature. And so with regard to man ; no other animal makes an approach to himself ; no other animal thinks, and reasons, and reflects, and compares, and determines.

It must be allowed by phrenologists that their seeming facts admit of many exceptions ; and it is not philosophical to generalize facts admitting of so many exceptions, into scientific principles, and to assume them as invariably correct, and, moreover, as suitable foundations for the erection of a new doctrine ; to say the least, this attempt is not judicious, and has been most unhappily, as well as most extensively, employed. We would by no means wish to deny or to affirm the facts or the general doctrines of phrenology ; we would leave the question to be decided by futurity ; we would merely say that it possesses neither facts nor doctrines which do not admit of explanation consistently with the supposition of the unity of the brain : it is only with the inferences which have been grafted (perhaps unjustly) upon it, that we feel it to be a unity to contend.

It is not easy to determine whether, for instance, perception, memory, judgment, are simply modes of action of *one* faculty, or whether they are separate faculties ; and it is

very clear, that the modification of a faculty is not to be mistaken for a separate faculty.

Without wearying the reader by abstruse points connected with this subject, it is important to save him from any practical error; and, therefore, it may be simply remarked, that while there is an evident connexion between a large development of brain and superior intellectual manifestations; it may also be very readily supposed that there is a close connexion between the quality of the mental manifestations, and that of the substance of the brain; and we can easily imagine further, that the manifestations of the one, and the manifesting power of the other, will vary according to their mutual and reciprocal influence. For we see that the influence of distant disorder is to disturb, and becloud, and mystify, and impair the manifestations of mind, so that a little irritation in the nerves of the stomach, would produce derangement in all the mental perceptions, and thoughts, and reasonings; and if this be the case, surely any irritation, or inaptitude of the organ itself, the centre of the nervous system, would produce a greater amount of alteration in the manifestations of mind.

The nature of this reciprocal influence,

involves the nature of the connexion between the brain and the mind, which hitherto has been, and probably ever will remain, an impenetrable mystery. It is perhaps one of those secrets upon which nature has placed her impassable seal. The experience of every thinking person, as well as the inferences from Divine revelation, will afford convincing evidence that the mind can work apart from matter; yet we have, on the other hand, abundant proofs, that the neglect of mental cultivation will lead to an impaired state of cerebral development; and that disordered action of the brain will produce enfeebled or distorted mental images. The inference therefore, is, that mental and physical development have a correlative influence, and should proceed together, not that mental action results from these movements of the brain.

But it will, perhaps, be asked, Why all this jealousy of the brain performing mental actions as its own actions? Why this nervous apprehension of the doctrines of materialism? The dispute is merely one of words,—and as it is not known what matter is, why may not mental actions be performed by material movements? Can there be any fear of this doctrine trenching upon the immortality of the soul, while it is

admitted that matter is indestructible, and, therefore, may be immortal? The objections against this doctrine of materialism are both doctrinal and practical.

In the first place, we may not be led away by the sophistry just mentioned, with regard to the indestructibility of matter, and the immortality of the soul. It is allowed, of course, by all, that matter is indestructible: but it is also allowed to exist in new forms and combinations; that is, that it is discerptible:—and if the mind can be separated and divided, and can enter into new forms and combinations, its unity and identity are destroyed,—its responsibility is lost: and, therefore, it is a matter of no small importance to avoid and rebut this material doctrine; which, in plain truth, would never be contended for, but from the wish to get rid of moral responsibility.

The practical objection against this doctrine would be, that they who have held it, have very generally fallen into grievous social or political delinquency; witness the practical examples obtained from its influence during the horrors of the French revolution; and from the demoralization of socialism in our own country. Besides, the doctrines of materialism are most

closely allied with atheism:—once allow the position that life is simply dependent upon the play of our organs; that mere cerebral matter thinks, and acts, and reasons; and the necessity for a Creator, Law-giver, and Moral Governor, is blotted from the list of man's wants: for if these be the result of material agency—of spontaneous vitality from the accidental aggregation of matter—and if his manifestations of mind be simply the irresponsible actions of nervous matter, over which he has no control, it is clear that a Supreme Being is unnecessary:—and, therefore, the doctrines of materialism are important—are most awful errors—and lead to consequences subversive of the moral happiness of man.

But it may be said, the apprehensions are unnecessary, and these inferences are unjust. It is indeed true, that these results have occurred among some of those who have held these doctrines, but not as a consequence of their influence: but then, on the contrary, some of those who held these errors, have been men of the highest benevolence, of the most correct moral conduct, and who have sought to do the greatest possible amount of good to their fellow creatures. We deny not the fact: speculative

error does not always lead to practical evils; but this is not what we have to consider; a man may possibly escape after swallowing prussic acid, but this is not an argument why prussic acid is not a poison, or why it may be taken with impunity. All we have to consider is the tendency of the doctrine, and if the tendency be evil, it must be rejected.

Still it will be said, that "no act is virtuous which does not lead to the greater happiness of the individual, and of the greatest number of individuals; and conversely, no act that is not virtuous can increase the happiness of the individual, and add to the happiness of the greatest number of individuals." There is, doubtless, a great deal of seeming truth, and of actual truth, in these propositions; and yet they are intended for the propagation of error. The real meaning of these words, is simply, that as man is at all times the creature of his organization, no act can be virtuous but that which carries out the design of such organization, which does not add to the selfish enjoyment of his organization, and which does not associate others in such organic pleasures; in fact, that no act can be virtuous which is not selfish, and which does not promote present pleasure. Such

is the proposition when divested of the false gloss which has been put upon it by utilitarian sophistry; and which leads no further than to the indulgence of man's appetites and passions without control, without remorse, without one self-denying emotion.

To ascertain the real nature of the greatest happiness principle, we have only to ask what is the happiness intended? Does it consist in the simple and short description of being good, and doing good? And if this question be answered affirmatively, where is the moral sanction by which corrupt propensity is to be repressed? Where are the moral wisdom and goodness by which man is to be directed into the right way? Where are present responsibility and a future existence, without which the former is an empty name? Where are obedience to the laws of God, the listening and yielding to the still small voice of conscience, and the whisper of heaven, or the simple revelation of the Great Moral Governor to his creature, man? These are objects which are not needed in the organic scheme of virtuous action—that scheme which abjures the principles of self-denial and self-control as alien from the greatest happiness principle; which broods under its dark wing

all the hideous progeny of indulged passion; which fosters into life every animal desire; which palliates and excuses the offences against society; which refuses to punish even the crime of murder! If such be the evils into which we may be led by the speculative notions of phrenology, although not necessarily connected with it, we should be carefully guarded against giving in our adhesion to a scheme of doctrine, which, though we deny not its positive truth, is yet quite unnecessary, and which is, in our days, associated with so much evil. We say not that all phrenologists entertain these views; we are well assured of the very contrary; but we say that such is the tendency of the present doctrines of phrenology, and such views are boldly asserted by those who call upon their more timid brethren honestly to avow conclusions which are inevitable from their positions.

Strange as it may appear, at first sight, it is a doubt often suggested, whether any real good arises from the pursuit of scientific knowledge, and whether the advantage of this pursuit does not terminate with intellectual gratification, and rather tend to exalt the idolatry of intellect, than produce the diffidence of Christian humility.

In reply to this doubt, let it be asked, Is it possible to become acquainted with the facts, so lately passed in review, without admiring the wisdom of Him who made all these wonders—the extraordinary proof of design in the structures thus contemplated—and the omnipotence of that creating Power, which, by an effort of his will, could command such results, and secure such nice adaptations of structure, to the wants and the position of man? Is it possible to doubt the goodness of that God, who has so mercifully provided for the wants of his creature? And if so, has not the inquirer been led by the pursuit of knowledge, to a conviction of the existence of a superior Governor, Creator, and Law-giver of the universe, whose power and wisdom and goodness are infinite, whose mercy extends to all his creatures—whose presence is everywhere—and by whose direct agency, all things are sustained and preserved?

This, however, is not the only lesson to be learned by the direction of the attention to the foregoing objects of natural knowledge; for it is impossible to follow man's history, without inferring that he has been precisely fitted for the situation he was destined to occupy. There

may be difficulties, there may be impossibilities in the way of our comprehending, what is to us incomprehensible, the results of infinite mind: but in this there is no difficulty equal to that of supposing that these things can have happened from the chance aggregation of atoms, or the laws of chemical affinity; and no honest person can quietly contemplate these efforts of creative mind, without concluding, that man has been precisely adapted for his present position.

And since man is a reasoning animal, is it possible that he can rest contented with this knowledge, and never seriously inquire into his own moral and physical position; that he can see the traces of infinite design in all within him and around him, without feeling and concluding, that the proofs of such design must exist as means to an end, and especially without asking, why he alone is peculiarly gifted with reason? What are the especial uses to which this faculty is to be applied? What are the characteristic peculiarities of the situation he has been called upon to fill? *How* he is to employ that reason—for whose benefit—and in whose service? What are the responsibilities which it entails, and in what way is it to be

used, so as to fulfil the intentions of the Great Designer, of that Infinite Mind, which has thus so largely gifted his highest creature?

Moreover, in conducting these inquiries, he perceives within him, a still small voice, which inclines him to that which is good, and approves of good conduct, which warns him of that which is evil, and passes its accusing frown upon that which is wrong in thought or conduct, which teaches him to ponder his ways, and to weigh in the scales of virtue, the effects of following this and that inclination: he feels that he possesses within himself a guide to conduct, arising from the combined agency of that reason with which a good God has endowed him; of that knowledge of Himself and of his laws, which he has been pleased to reveal; and of the still and secret influence of the Spirit, which says, through the operation of conscience, "This is the way—walk ye in it!" And he concludes that these extraordinary gifts must entail upon him extraordinary responsibilities, and that the latter will have respect to the nature of his gifts, and to their right employment for the good of his fellow man, and for the honour of God—and this simply, because he perceives that there is no

affinity between reason and organism, no natural termination to mental existence, no defined end to all these wonders, but in the future world, which has been revealed to him.

And if man be a reasoning, so is he also a reflective animal. Not only does he reason on the present and anticipate futurity, but he looks back, also, on the past; and then does he feel how frequently he has failed of his duty, and of doing his very best in the state in which it has pleased God to place him. From deeply feeling his past misdoings, and from seeing how often he has strayed, from inadvertence and ignorance, how frequently he has failed, from listlessness and want of energy, how often he has lost opportunities of usefulness from mere carelessness, and more than all, how often he has knowingly acted wrong, despite his better convictions; from all these concurrent causes, he perceives his own helplessness, and discovers that he is not prepared to receive and listen to that revelation of God's will which has been made to him, by his omniscient, omnipotent, and all-bountiful Creator, for his guidance through life—but that his heart is opposed to the law of God; that he has no disposition to obey it, that he is selfish where

he ought to be benevolent; that he evades, rather than courts, to his utmost power, the demands of charity; that he listens to the voice of passion which he is commanded to subdue; that he follows his own inclination without consideration for the many; that he is proud, when he ought to be humble; revengeful, when he ought to be forgiving; hating, when he ought to cherish affection; neglecting, when he ought to be diligent; and devoted to objects of present consideration, when these objects should only be weighed in the balance of truth, and estimated in their relation to eternity.

Having arrived at these conclusions, has he not been directly led from natural to spiritual knowledge, from the pursuits of science to that conviction of his own helplessness which is the first germ of spiritual life, and which leads him to the Bible as the foundation of all religion? Has he not been taught that his talents are given him for cultivation and improvement, such improvement consisting in their largest possible development, in their greatest usefulness to others, and in their unflinching devotion to the service of the Giver?

In fact, the pursuit of science, rightly con-

ducted, discovers to man his own ignorance and feebleness, his imperfection and liability to error, the perversion of his reasoning powers, his own unassisted helplessness, and his need of instruction in every part of his life and conduct; and by the urgency of these considerations, he is led to inquire, whether there be not some remedy for these confessed evils; whether there be not some mode of restoration to his original perfectness, found beyond the gauge of human intellect; and he is thus prepared to receive that revelation of God's will, which he has been pleased to vouchsafe to erring man, in that best of all books, the Bible—that book, which, to the sincere inquirer, will be found to be the best guide of conduct on earth, and to happiness in heaven.

CHAPTER IX.

Great object of man's life—His intellectual, social, relative, civil, and religious duties—Conclusion.

HAVING thus conducted our inquiry through those subjects which relate to physical and intellectual life, it only remains for us to take a brief review of man's social, moral, and spiritual relations.

We have seen man in all the perfection of his exquisite formation; we have seen him in all his intellectual superiority; we have seen him with all his reasoning powers and all his improvable attainments; and can it be reasonably supposed, that a creature so gifted, was placed in the world without any design beyond that of merely amusing himself, and pleasing himself, and following out his selfish wishes and desires? This supposition would be at variance with all we know of nature's agencies throughout the remainder of her wide dominion. With regard to all her other productions, every creature fulfils as obvious and manifest design;

and can it be supposed, that the creature upon whom the largest amount of skill has been expended, should be the only one created to no purpose, and without any design of filling an appropriate sphere in the world? Reason at once rejects so monstrous a supposition, and looks after some traces of the object for which man was designed. Now it would be quite impossible to suppose that his moral feelings should be without some light to guide them: and since the light of nature is, by all experience, shown to be inadequate, we are prepared to receive some indication of the will and of the laws of the Supreme Moral Governor of the world: and this indication of his will has been given us in revelation. It is, therefore, to revelation that we must make our last appeal; from this we must draw rules for the regulation of conduct — from this we must educe motives to do right!

And what is it to do right? We might shortly say, it is first to cultivate the intellectual powers which have been given us; to do our duty zealously in the several relations of life; to deny ourselves whenever the gratification of selfish inclination may interfere with, or diminish our power, or capacity, or inclina-

tion, to contribute to general or individual comfort, or improvement, or well-being; to seek the good of others,—to do justice and love mercy, and to walk humbly in all the commandments of God.

We have thus opened upon a wide field of observation and inquiry, which we can only glance at, and shall be able to notice but a few of its prominent topics. The cultivation of our talents and opportunities for usefulness, seems to be the first thing required of us. Each one has a certain amount of intellectual possession, a certain sphere of influence and usefulness; and according to that amount and that sphere, is he called upon to exert himself to the utmost to promote the welfare of his fellow-man, and to live to the glory of Him from whom he has received his talents, and by whom he has been placed in his circle of duties. Ignorance is a crime, because he may be wise if he will:—indolence is a crime, because he sacrifices his own good, and the good of others, by the want of exertion. It is not, therefore, necessary to be guilty of great crimes in order to contravene the laws of God, in regard to man's existence; it is enough that he is ignorant of what he might know, or omits to do

good from the want of cheerful exertion; and, in either case, he is a moral delinquent. And what man upon earth can plead guiltless to this simple indictment?

Intellectual cultivation itself is not without its dangers; if confined to its legitimate object, the withdrawal of the young and the inexperienced from the grosser attractions of animal sensation to the cultivation and improvement of intellectual talent, to the acquisition of general knowledge, and to the development of the love of scientific pursuits, in subordination to the great final object of man's existence here, the effect can be only good, and can only lead to the improvement of man in all his faculties and powers and privileges, and in all the social relations of life.

But knowledge is power; and this power may be excited for evil as well as for good, and will prove to its possessor a blessing or a curse according to the mode of its employment. It is an increase of talent, and, therefore, involves an increase of responsibility; and if not employed for the expansion of the heart, and for the good of others, and devoted to the glory of God,—if neglected or abused, it will only aggravate moral delinquency. Therefore, increase

of knowledge demands from its possessor increasing benevolence to man, increased activity in doing good, augmented self-distrust and greater devotedness to him who is the Source of all knowledge, and who is emphatically Lord of all.

But if ever the successful aspirant after knowledge shall be tempted to look down upon his less gifted neighbours with disparagement, if the conscious acquisition of more knowledge should lead to the swellings of pride in his bosom, or to a supercilious comparison between himself and his less privileged compeer; if ever he should be tempted to exalt reason above her just and natural position; if ever he should be tempted to forget his own dependence even for the continuance and exercise of that reason upon the Author and Giver of all good; if ever he should be tempted to carry the puny torch of finite reason in order to conduct him through the meridian splendour of revelation made by Infinite Wisdom; if ever he be tempted to listen to the voice of those who would limit his present duties and future prospects to that only horizon which reason can descry, he would place himself in the position of an ignorant man, who might believe the world to be

bounded by his sensible horizon, because he could see no further; he would have forgotten the right use of reason, he would have strayed from the legitimate employment of talent, and he would have thrown away the light of revelation, the only light which can be a lamp to his feet, and which can guide his way through this world's trials to the mansions of happiness prepared for those who love and serve God acceptably. "Wisdom is the principal thing: therefore get wisdom, and with all thy getting get understanding."

To return from this digression: man is placed in society, and has duties to perform towards his fellow-creatures generally, more especially to instruct the ignorant, to succour the wretched, to comfort the afflicted, to feed the poor, to clothe the naked, to alleviate misery in every possible form, and to diffuse the largest amount of good amongst mankind. Every individual may help on these objects, though, perhaps, in different ways; one by pecuniary aid, another by the weight of his influence, a third by personal exertion, and a fourth by the moral suasion of that example which operates more powerfully than precept. It matters not how; each one may contribute

to the general good in his own way; and if he be forgetful of this duty, if he be unmindful of these social affinities, he is a delinquent against society, and has infringed the laws of God.

Again, man has certain relative duties to perform in the smaller circle of his own family, as well as towards the larger family of man Each one is a father, or mother, or a son, or daughter, or a husband, or wife, or a brother, or sister, or a friend, or acquaintance, and in each one of these relations there are peculiar duties to fulfil, and for the conduct in these several relations, there are given us, in Divine revelation, just and equal laws. But the standard taken is a high one; and, through infirmity, through that enfeebling and debasing change which has passed upon all, man is unable, as well as unwilling, to live up to the level of its high requirements, and in this respect, too, he fails of his duty. That man is to be pitied, if such there be, who, in the cool moments of reflection, can lay his hand upon his heart, and can say that he has not done that which he ought not to have done, and has not left undone that which he ought to have done in all and in each one of these several relations. That man is to be pitied, if such there

be, for his conclusion must have arisen either from ignorance of the active duties required, or from an amount of pride which renders him impervious to the monitions of conscience.

Man has a still wider circle of duties ; he is a citizen, the subject of a government, and as such is called upon for obedience to its laws, and for all his efforts to promote the welfare of the state. The idea of a national government involves also the sacrifice of a certain portion of individual liberty. It is no longer that every person does as he likes best, and acts according to the impulse of his desires ; it is no longer each individual who protects his own property or reputation, and who personally seeks to avenge an injury which may have been done to the one or to the other; it is no longer the individual who proclaims his own right to follow the dictates of passion, and to take summary vengeance upon every object of his displeasure; but all having felt the evils which have arisen, and must arise from this selfish mode of despatching justice, have agreed to sacrifice their own natural rights, and for the common weal, to place them in the hands of the civil magistrate, who shall from time to time make laws for the good and the governance of the com-

munity. To these laws each individual is bound to render obedience, and supposing that he shall have kept within the limit of their letter, he will still oftentimes have infringed upon their spirit and their principle, in things and under circumstances which the laws cannot touch, for human laws can only have respect to outward acts, and can in no way control those minor evils of society which pervade its frame-work; and which so existing again render the individual a moral delinquent. A man may not have murdered his neighbour, or done him some grievous bodily harm, with a knowledge and intention of so doing; he may not have burglariously entered his dwelling-house or taken from him his property by any overt act of dishonesty; a man may not have rendered himself amenable to the laws of slander, and yet, in all these instances, he may have thirsted for revenge, he may have sought opportunities to take unfair advantage, or he may have blasted a reputation with a sneer or a look, or even by the absence of saying all he knew; and yet in all these things, while he has kept the letter he has infringed the spirit of the law, and is a delinquent against society.

Once more, man is called upon as a good

subject to support his government, and to do all he can to strengthen its hands, and maintain its power. Not that we would deny the individual right to canvass the conduct and proceedings of government; but we would assert, that the government has a right to expect his support, and is injured by his opposition. There are mistakes on this subject which it may be right to mention. In the first place, we have by supposition conferred upon the governors, the right of making laws for the general good, and, *as individuals*, we have no right to hesitate obedience to these laws, because they may interfere with some of our individual schemes; the only thing that can be asked, is, that they be framed to promote the general good, for the general good is perfectly compatible with individual discomfort, or even individual suffering.

Again, there are charges incurred by the government for carrying on its general functions, for the maintenance of its authority, for the enforcement of its laws, for its defence, even for its wars, and for the payment of its debts, or of the interest due upon them; and all these charges are to be met by certain general imposts, termed taxes. Now, however dis-

agreeable and inconvenient it may be, these things should be cheerfully and honestly paid, and the latter is mentioned advisedly, because many persons think there is nothing wrong in evading the taxes and cheating the government. Now the fact is, that the act of dishonesty is the same, whether committed towards an individual, or a body of individuals who have been placed in authority and power by the community as their representatives. And yet, further, it is obvious, that, as a certain sum must be raised, every person who evades a tax, is guilty of an act of dishonesty towards those who do not evade it, because by his evasion he makes the honest portion of the commonwealth pay more than they have a right to do; and in this way, such an evasion is a moral delinquency towards the government, and towards his fellow-citizens. True, indeed, that these things are done thoughtlessly: the more necessary is it to point out the real and unchanging principles upon which conduct should be formed. The same thing is to be said of smuggling, or of any and every other way in which the revenue is directly or remotely diminished; the error is twofold: first, against the government, and then, against society. It

is not a public, but a private offence; it is a dereliction of duty to the ruling powers, and to neighbours.

It is the duty of every good citizen to uphold the government under which he happens to be placed; not that he is called upon to be blind to its errors and corruptions, to contend that it is immaculate, that it cannot do wrong, and that it must be implicitly obeyed in all things. It is indeed true, that all laws should be obeyed, if not contrary to the express laws of God; they may be altered and improved but while they exist, they must be obeyed as they are; yet a good citizen ought to keep a watchful eye over the public proceedings, and he should also endeavour to uphold, and not embarrass, its movements. We cannot too thoroughly deprecate that spirit of insubordination, that recklessness to established authority, that ardent desire to substitute individual and unbridled license for the wholesome restraint of paternal authority, which has been too visible of late years; and while we smile at the passive obedience of the entrammelled mind of bygone days, and smile with real pity on its feebleness, we contemplate with horror and alarm the gigantic upheavings of that volcanic mind which

seeks to throw off all the superincumbent weight, and to scatter the fragments of society into rude and shapeless masses of destructive confusion.

But, finally, we must add a few words on the spiritual life of man; and here it is that reason shows her incompetency, and we are indebted to revelation only for all we know. We have seen that man possesses a faculty which distinguishes him from other animals and raises him above them; we have seen that he possesses the gifts of reason, reflection, and moral sense; that he possesses sentiments, emotions, and feelings which are utterly at variance with anything we know of the animal creation, and which bespeak him as of an order of being superior to every other class. We have seen that this superiority consists in the superadded principle which we call mind or soul, and here our natural knowledge ceases.

We should indeed infer, on a principle of analogy, that our mental powers, limited as they are to the short duration of life, contracted as they are by the varieties of the mental organs, through which their manifestations are made; debased as they are by all the alloy of selfishness and animal passion, on the

one hand, and exalted as they are, on the other, by all the longing after immortality, could not be destined to find their termination in the present life; we should infer that there must be a Moral Governor of the universe, and that the essence of his government would be to reward the good and punish the evil; that, as man was evidently placed in a state of trial, and difficulty, and danger, it must be a state of probation to bring out his good and correct his bad properties, and to give him an opportunity of choosing good and refusing evil, and obeying the dictates of the one, and conquering the temptations of the other. And since we see, that these objects are not accomplished in life, that virtue is not always rewarded, nor vice punished, but the contrary, we should infer that there must be a day of retribution, a future state of rewards and punishments, in which the inequalities of life would be adjusted, oppressed virtue would be dignified, and successful vice would meet its just punishment.

But it is from revelation that we learn the full truth of all these reasonings; and it is from this only that we find the fulness of the Godhead brought before our view. There we learn

that man was created in the image of God, that he was originally very good, created perfect to live as in the presence of God, and to obey his laws. But he fell from this high estate, and forfeited the love and favour of the Most High by disobedience. Thus, sin and death were introduced into the world, and the early history of the first family of man was stained by the crime of murder. The effect of this fall and corruption, has been the handing down of a depraved nature to all the posterity of Adam. Though our first parents were very good—sinless—yet none will presume to say, that their children have been such. On the contrary, the history of man, downwards, to the present day, has been one of crime, and war, and bloodshed, and every evil,—nor has his private history been less marked by alienation from that which is good, and fondness for that which is evil. In the review which we just now took, we have shown how thoroughly man is a moral delinquent in the present day; how little he lives up to his high destiny; how far he is from perfection; how greatly he is the slave of passion. We mean not to say, that man has not some fine qualities, and that in the better specimens of our race, there are not some high principles,

some deeply cherished affections, some admirable motives to action. These, perhaps, have been called into prominence by religious principles implanted in the heart, we know not how; but we do mean to say, that man left to himself, to the unchastised and uncontrolled influence of his passions and propensities, is a guilty creature, and thus is proved the great doctrine of the corruption of human nature. And this is a corruption not simply of ignorance, but of determined opposition to the revealed will of God.

This revealed will of God has exhibited a code of laws for the regulation of man's life and conduct, and for the government of his heart; and these laws have annexed rewards to those who keep, and punishment to those who break them. But they are broken by mankind continually; and they have been despised and derided and contemned by the great family of man. Consequently these have become amenable to the penalties denounced against their infraction, and all the world has become guilty before God, and exposed to the punishment of eternal death. But "God, who is rich in mercy," and who is ever seeking after the happiness of his creature man, has in infinite wisdom and

beneficence, devised a plan by which this so lost and ruined creature may be restored to his favour, and to all his original privileges. And this is accomplished through an atonement for sin, made by the Mediator, the Lord Jesus Christ, who suffered for sin, that we, through his sufferings, might be reconciled to God, and made inheritors of the world to come. Thus God sent his only begotten Son into the world, to take upon him our nature, and in that nature to expiate the guilt of sin by suffering death upon the cross. Thus Christ died for the sins of the whole world, and made a full, perfect, and sufficient sacrifice for them: thus has Christ washed away the guilt of all those who truly repent and turn unto him. Every one capable of knowing good from evil has offended against the holy law of God, has thereby forfeited his favour, and can only be restored to that favour by being washed in the blood of Christ: and in order to this effect, the sinner must believe in the efficacy of Christ's sacrifice, and must humbly and faithfully ask for an interest in this pardon. God has declared that he will listen to those who ask, but that he will be sought after. Now man has no power to think a ood thought, or

do a good action; and, therefore, there is promised him the aid of the Holy Spirit, from whom all good works and holy desires do proceed, to lead his mind into all truth, to enable it to exercise belief in Christ, and to prepare it for the receipt of pardon.

And supposing this pardon has been vouchsafed in God's own way, still man is left to exhibit the results of the change which has passed upon him through the grace of God, by his being still kept in the situation of trial, and difficulty, and danger: and though there may be none strong enough, or perfect enough, never to deviate from the right line of truth; yet the prevailing path of the good man will be marked by such an amount of obedience to God, of virtuous conduct, of benevolence and charity to his fellow-men as clearly distinguishes him from those who look not beyond to-morrow's joys, as an aspirant for immortality. The daily life of the Christian is stamped by a prevailing desire to do good to his fellow-creatures—not from the apprehension of punishment arising from a disregard of this law, but from a real desire to promote the glory of God, and increase the amount of happiness and of holiness in the world. Life is the time to serve God acceptably: and

this service is the most effectually rendered by promoting the knowledge and the love of God, and of his laws in the world.

And then, when life is drawing towards its close, the good man looks backward with satisfaction on the difficulties he has conquered, the trials which he has sustained, the evils which he has escaped, and the good which he has done through the aid of God's grace and goodness: and he looks forward with joy to the shadows of night, which are fast closing in upon him, as being only that temporary darkness which is to usher in a day of unclouded brightness—the day of immortality, where there shall be no more night, and where the sun shall no more go down.

May it be the happy lot of the readers, and the writer, to escape the evils of life; and being purified by the blood of Christ, to enter into that exceeding joy which is inexplicable, but which has been revealed to us, as "fulness of joy for evermore:"—and when our appointed task in this life is accomplished, may we all reach that haven, "where the wicked cease from troubling, and the weary are at rest."