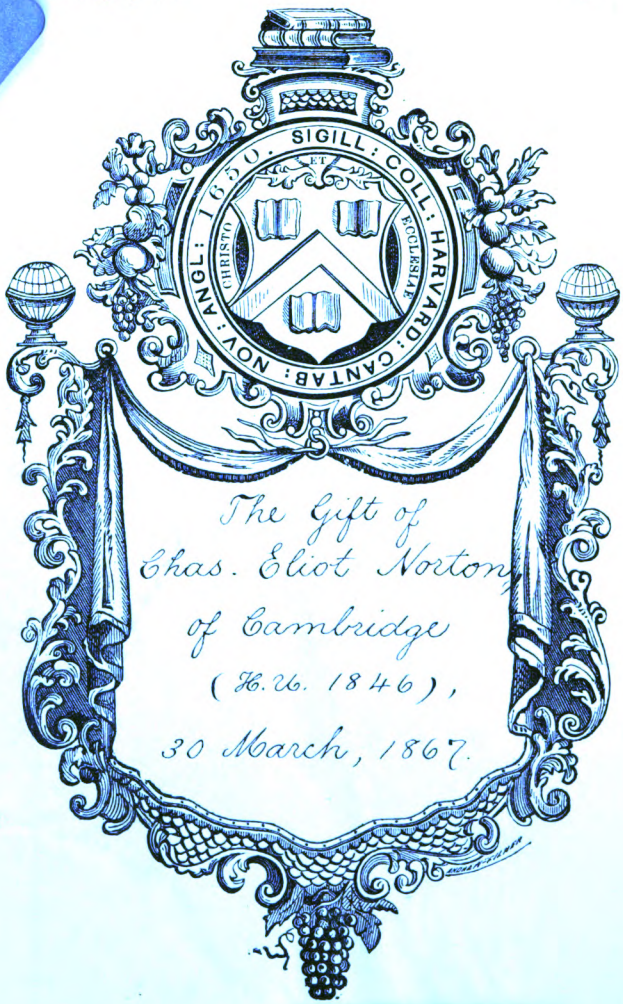

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OBSERVATIONS

ON THE

SCIENTIFIC STUDY OF HUMAN NATURE.

A LECTURE DELIVERED BEFORE
THE LONDON COLLEGE OF PRECEPTORS,
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"No system or rule of practice in education can safely be admitted which does not associate itself with this part of science (physiology)."

SIR HENRY HOLLAND.

"If it be possible to perfect mankind, the means of doing so will be found in the medical sciences."

DESCARTES.

"Of old it was the fashion to try to explain nature from a very incomplete knowledge of man; but it is the certain tendency of advancing science to explain man on the basis of a perfecting knowledge of nature."

DR. HENRY MAUDSLEY.

ON THE SCIENTIFIC STUDY OF HUMAN NATURE.

PERHAPS the most correct conception of science that has yet been formed is that which regards it as the highest stage of growing knowledge. Ideas about men, like those about other subjects, undergo development. There is a rude acquaintance with human nature among barbarians: they observe that the young can be trained, and that men are influenced by motives and passions; for without some such knowledge, their limited social relations would be impossible. These primitive notions have been gradually unfolded by time into the completer and more accurate ideas which mark the civilized state. Yet the prevailing knowledge of human nature is still imperfect and empirical—that is, it has not expanded into rational principles and general laws. That it will become still more perfect accords with all analogy; and if this process continues, as it undoubtedly must, there seems reasonable hope of the formation of something like a definite Science of Human Nature.

That the scientific method of inquiry is inadequate and inapplicable to the higher study of man, is a widely prevalent notion, and one which seems, to a great extent, to be shared alike by the ignorant and the educated. Holding the crude idea, that science pertains only to

the material world, they denounce all attempts to make human nature a subject of strict scientific inquiry, as an intrusion into an illegitimate sphere. Maintaining that man's position is supreme and exceptional, they insist that he is only to be comprehended, if at all, in some partial, peculiar, and transcendental way. In entire consistence with this hypothesis, is the prevailing practice; for those who by their function as teachers, preachers, and lawgivers, profess to have that knowledge of man which best qualifies for directing him in all relations, are, as a class, confessedly ignorant of science. There are, some, however, and happily their number is increasing, who hold that this idea is profoundly erroneous, that the very term "human nature," indicates man's place in that universal order which it is the proper office of science to explore; and they accordingly maintain that it is only as "the servant and interpreter of nature" that he can rise to anything like a true understanding of himself.

The past progress of knowledge, as is well known, has not been a steady and continuous growth: it has advanced by epochs. An interval of apparent rest, perhaps long protracted, is brought to a close by the introduction of some new conception, which revolutionizes a department of thought, and opens new fields of investigation, that lead to uncalculated consequences. Those who have watched the later tendencies of scientific thought can hardly fail to perceive, that we of the present age are entering upon one of those great epochs in our knowledge of man. Standing at the head of the vast system of being of which he forms a part, it is inevitable that the views entertained concerning him at any age will be but a reflex of the knowledge of

nature which that age has reached. So long as little was known of the order of the universe, little could be understood of him in whom that order culminates. Those triumphs of science which are embodied in external civilization are well fitted to kindle our admiration; but they are of secondary moment when compared with the consequences which must flow from the full application of the scientific method to the study of man himself.

The method of regarding man which tradition has transmitted to us from the earliest ages, is, at the outset, to cleave him asunder, and substitute the idea of two beings for the reality of one. Having thus introduced the notion of his double nature—mind and body as separate, independent existences—there grew up a series of moral contrasts between the disjointed products. The mind was ranked as the higher, or spiritual nature, the body as the lower, or material nature. The mind was said to be pure, aspiring, immaterial; the body gross, corrupt, and perishable; and thus the feelings became enlisted to widen the breach and perpetuate the antagonism. Having divided him into two alien entities, and sought all terms of applause to celebrate the one, while exhausting the vocabulary of reproach upon the other, the fragments were given over to two parties—the body to the doctors of medicine, and the spirit to the doctors of philosophy, who seem to have agreed in but one thing, that the partition shall be eternal, and that neither shall ever intrude into the domain of the other.

As a necessary consequence of this rupture, the living reality, as a subject of study, disappeared from view, and the dignified fraction was substituted in its place.

Not *man*, but *mind*, became the object of inquiry. With the disappearance of the actual being, went also the conception of individuality, and there remained only *mind as an abstraction*, to be considered as literally out of all true relations as if the material universe had never existed. The method thus begun has been closely pursued, and for thousands of years the chief occupation of philosophic thought has been to speculate upon the nature and operations of mind as manifested in consciousness. Admitting the legitimacy of the inquiry, and that it has to a certain extent yielded valid results, it is clear that the effect of the divorce was fatally to narrow the course of investigation and to prevent all free and thorough research into the reality of the case; thus justifying the charge of emptiness and fruitlessness which is now so extensively made against metaphysical studies. From Plato to Sir William Hamilton, who inscribed upon the walls of his lecture-room, "*On earth there is nothing great but man; in man there is nothing great but mind*," a method has been pursued so confessedly vacant of valuable results, that its partizans have actually denied the attainment of truth to be their object: declaring that the supreme aim of philosophy is nothing more than to serve as a means of intellectual gymnastics.*

In pointed contrast with this view is the method of modern science. In a spirit of reverence for the order and harmony of nature where all factitious distinctions of great and small disappear; striving to dispossess herself of prejudice, and to aim only at the attainment of truth; rejecting all assumptions which can show no better warrant than that they were made in the infancy of the

* See the opening lectures of Hamilton's Metaphysics.

race, she begins with the simple examination of facts, and rises patiently and cautiously to the knowledge of principles. The study of man is entered upon in the same temper, and by the same methods, that have conducted to truth in other departments of investigation. Finding the notion of his duality, as interpreted in the past, with its resulting double series of independent inquiries, to be erroneous, science proceeds at the outset to reunite the dissevered fragments of humanity, and to reconstitute the individual in thought as he is in life, a concrete unit—the living, thinking, acting being which we encounter in daily experience. It is now established that the dependence of thought upon organic conditions is so intimate and absolute, that they can no longer be considered except as unity. Man, as a problem of study, is simply an organism of varied powers and activities; and the true office of scientific inquiry is to determine the mechanism, modes, and laws of its action.

My purpose, on the present occasion, is to show that the doctrine which has prevailed in the past, and still prevails, is doomed to complete inversion; that the bodily organism which was so long neglected as of no account, is in reality the first and fundamental thing to be considered; and that, in reaching a knowledge of mind and character through the study of the corporeal system, there has been laid the firm foundation of that Science of Human Nature, the completion of which will constitute the next and highest phase in the progress of man. Of course, so vast a subject can receive but scanty justice in the limits of a lecture: the utmost that I can hope to do will be to present some decisive illustrations of the dependence of mental action upon the bodily system, and to point out certain important results which

have been already arrived at by this method of inquiry. A hasty glance, in the first place, at the several steps by which it has been reached, will help to an understanding of the present state of knowledge upon the subject.

The establishment of the modern doctrine, that the brain is the organ of the mind, naturally led to a train of researches into the conditions of the connexion. The instrument of thought, being a part of the living system, is, of course, subject to its laws, and our understanding of its action becomes dependent upon the progress of physiological knowledge. Physiology, again, depending upon the various physical sciences, the higher investigation could proceed only with the general advance of inquiry. The discovery of the circulation of the blood laid the foundation for the modern science of physiology; but that discovery did not reach its full significance until chemistry had revealed the constitution of matter, and the reciprocal action of its elements: only then was it possible to arrive at the great organic laws of waste and repair, of digestion, nutrition, and respiration. The brain, in its functional exercise, was found to depend, equally with all other living parts, upon these processes. The discovery of the minuter structure of the brain resulted from the application of the perfected microscope. Its grey matter was found to consist of cells, and the white substance of fibres of amazing minuteness —the cells being regarded as the sources of nerve-power, while the fibres serve as lines for its discharge.

When a tolerably clear conception of the structure of the nervous system had been reached, physiology immediately propounded the question of its mode of action. The first decisive response was made a number of years ago, by Sir Charles Bell, who found that there are two

great systems of nerves, which perform different functions; one conveying impressions from the surface of the body to the centres, and another transmitting impulses from the centres to the muscles, and thus controlling mechanical movement. This discovery was of the gravest importance. It had been contemptuously asked, What has anatomy to do with mind? Bell silenced this cavilling for ever by showing that it first revealed a definite mental mechanism, and traced out some of the fundamental conditions of the working of mind.

A few years later, Dr. Marshall Hall made another very important step, in determining the organic conditions of mental activity, by the discovery of the independent action of the spinal cord. It had hitherto been held, that the brain was the sole seat of nervous power. All impressions were supposed to be conducted directly to it, and all mandates to the muscles to issue from it; and as the brain was the seat of consciousness and volition, these operations were thought to be essentially involved in every bodily action. But Dr. Hall demonstrated that the spinal cord is itself a chain of nerve-centres, and that impressions reaching it from the surface through the sensory nerves, may be immediately *reflected* back, through the motor nerves, upon the muscles, thus producing bodily movements, without the brain being at all involved. This is termed *reflex action*. Thus, if the foot of a sleeper be tickled, it will be jerked away—that is, the impression from the skin is conveyed to the spinal centre, and an impulse is immediately reflected back, which contracts the proper muscles of the limbs, and the foot is withdrawn. The most perfect example of it, however, is where stimulus at the surface produces movements of the limbs after division of the

cord from the head, and therefore in total unconsciousness. The discovery of reflex action was the first step in the systematic elucidation of the spontaneous movements, or what is known as the *automatic system* in animal mechanisms.

But reflex action has another aspect. When an impression passes upward along the cord to the nervous masses at the base of the brain, it first flashes into consciousness and becomes a sensation. Reflex effects now take place, in which sensation and consciousness are implicated. Winking, sneezing, coughing, swallowing, are examples: we are conscious of the actions, but they are not the results of volition. The will may, indeed, exert a partial control over them, but they are usually of an automatic character. Thus far, the part of the nervous mechanism called into action is the spinal system, and the ganglionic masses at the base of the brain known as the sensorium. This apparatus is not peculiar to man; he shares it with the entire vertebrate series, and it is regarded as the source of all purely instinctive actions.

The establishment of these fundamental facts in reference to the working of the mental mechanism of our nature—the definite separation of a large part of its actions from that higher sphere of intellection and volition to which they had hitherto been assigned, was a signal event in the progress of physiological inquiry, as it quickly led to the extension of the principle of automatism, to the cerebrum itself. This portion of the brain is now regarded as the organ of all the higher mental activities;—the seat of ideas and of the complex intellectual operations, memory, imagination, reason, volition. The most obvious case of reflex cerebral action is where a remembered or suggested idea produces a

spontaneous movement. Thus, the recollection of a ludicrous incident may excite an involuntary burst of laughter, the remembrance of a disgusting taste may cause vomiting. When ideas are associated with pleasure or pain, a class of powerful feelings is produced,—the emotions, which become the springs of impulsion, or reflex activity. Those bursts of movement which are peculiar to the various emotions, as anger, terror, joy, and which we term their *expressions*, are examples of cerebral spontaneity.

These facts prepare us to understand the scope and limits of voluntary activity, the function of which is to restrain the impulsive tendencies, and direct the bodily movements to various ends. In voluntary action the will does not replace or dispense with the involuntary system, but rather *uses* it. Its action is limited by the laws of the vital mechanism with which it works. Of all the numberless movements going on in the organism, volition has control only of the muscular, and of these but partially. It cannot act directly upon the muscles, but liberates nerve-force in the brain, which, in turn, produces muscular contraction. The voluntary powers determine the *end* to be accomplished; and employ the automatic system to execute the determination. I will a given action, and of the many hundred muscles in my system, a certain, and perhaps a large number, will be called into simultaneous exercise, requiring the most marvellous combinations of separate actions to accomplish it; but the will knows nothing of this, it is concerned with the *result* alone.

In the formation of habits and in the processes of education, voluntary actions are constantly becoming reflex, or, as it is termed, "secondarily automatic." Thus

learning to walk at first demands voluntary effort, but at length the act of walking becomes automatic and unconscious. So with all adaptive movements, as the manipulatory exercises of the arts; they at first require an effort of will, and then gradually become "mechanical," or are performed with but slight voluntary exertion. And so it is, also, in the purely intellectual operations, where the cerebral excitement, instead of taking effect upon the motor system, expends itself in the production of new intellectual effects, one state of consciousness passing into another, according to the established laws of thought. Here, also, the agency of the will is but partial, and the mental actions are largely spontaneous. In the case of memory, we all know how little volition can directly effect. We cannot call up an idea by simply *willing* it. When we try to remember something, which is, of course, out of consciousness, the office of volition is simply to fix the attention upon various ideas which will be most likely to recall, by the law of association, the thing desired. We have all experienced this impotence of the will to recover a forgotten name, or incident which may subsequently flash into consciousness after the attention has long been withdrawn from the search. The same thing is observed in the exercise of the imagination. It is said of eminent poets, painters, and musicians, that they are born, and not made; that is, their genius is an endowment of nature,—a gifted organism which spontaneously utters itself in high achievements, and they often present cases of remarkable automatism. When Mozart was asked how he set to work to compose a symphony he replied, "If you once *think* how you are to do it, you will never write anything worth hearing; I write because I cannot help it." Jean Paul

remarks of the poet's work: "The character must appear living before you, and you must hear it, not merely see it; it must, as takes place in dreams, dictate to you, not you to it. A poet who must *reflect* whether, in a given case, he will make his character say Yes, or No, to the devil with him!" An author may be as much astonished at the brilliancy of his unwilled inspirations as his most partial reader. "That's splendid!" exclaimed Thackeray, as he struck the table in admiring surprise at the utterance of one of his characters in the story he was writing. Again, the mental actions which constitute reasoning, have an undoubted spontaneous element, the office of volition being, as in the former cases, to rivet the attention to the subject of inquiry, while the gradual blending of the like in different ideas into general conceptions is the work of the involuntary faculties. You cannot will a logical conclusion, but only maintain steadily before the mind the problem to be solved. Sir Isaac Newton thus discloses the secret of his immortal discoveries: "I keep the subject constantly before me, and wait till the first dawnings open, by little and little, into a full light."

But corporeal agency in processes of thought has an aspect still more marked; the higher intellectual operations may take place, not only independent of the will, but also independent of consciousness itself. Consciousness and mind are far from being one and the same thing. The former applies only to that which is at any time present in thought; the latter comprehends all psychical activity. Not a thousandth part of our knowledge is at any time in consciousness, but it is all and always in the mind. An idea or feeling passes out of consciousness, but not into annihilation; in what state,

then, is it? We cannot be satisfied with the indefinite statement, that it is stored away in the receptacle or chamber of memory. Science affirms an organ of mind, and demands an explanation, in terms of its action. As the thought passes from consciousness, something remains in the cerebral substratum, call it what you will, —trace, impression, residue. What the precise character of these *residua* may be, is perhaps questionable, but it is impossible to deny their existence in some form consistent with the nature of the cerebral structure and activity. All thoughts, feelings, and impressions, when disappearing from consciousness, leave behind them in the nerve substance, their effects or residua, and in this state they constitute what may be termed latent or statical mind. They are brought into consciousness by the laws of association, and there is much probability that, in this unconscious state, they are still capable of acting and reacting, and of working out true intellectual results.

There are few who have not had experience of this unconscious working of the mind. It often happens that we pursue a subject until arrested by difficulties which we cannot conquer, when, after dismissing it entirely from the thoughts for a considerable interval, and then taking it up again, the obscurity and confusion are found to have cleared away, the subject is opened in quite new relations, and marked intellectual progress has been made. Nor can we explain this by assuming that the arrest was simply due to weariness, and the clearer insight to the restoration of vigour by rest, as after a refreshing night's sleep. Time enters largely as an element of the case; weeks and months are often required to produce the result, while the entirely new

development which the subject is found to have undergone, seems only explicable by the intermediate and unconscious activity of the cerebral centre. The brain also receives impressions and accumulates residua in partial or total unconsciousness. In reading, for example, we gather the sense of an author most perfectly while almost oblivious of the separate words. And thus, as Dr. Maudsley remarks, "the brain not only receives impressions unconsciously, registers impressions, without the co-operation of consciousness, elaborates material unconsciously, calls latent residua again into activity, without consciousness, but it responds also as an organ of organic life to the internal stimuli, which it receives unconsciously from other organs of the body." *

Science now teaches that we know nothing of mental action, except through nervous action, without which there is neither thought, recollection, nor reason. An eminent authority upon this subject, Dr. Bucknill, says, "The activity of the vesicular neurine of the brain is the occasion of all these capabilities. The little cells are the agents of all that is called mind, of all our sensations, thoughts, and desires; and the growth and renovation of these cells are the most ultimate conditions of mind with which we are acquainted." And again, "Not a thrill of sensation can occur, not a flashing thought, or a passing feeling can take place without a change in the living organism, much less can diseased sensation, thought, or feeling occur without such changes."

These facts sufficiently disclose the agency of the bodily system in carrying on mental action; but the view becomes still more impressive when we observe to

* On the Method of the Study of Mind. Page 18.

what an extent corporeal conditions influence and determine intellectual states.

The weight of the human brain ranges from sixty-four ounces to twenty ounces, and, other things being equal, the scale of intellectual power is held to correspond with its mass. Cerebral action has thus an enormous range of limitation, due to the variable volume of the mental organ, but it is also modified in numerous ways and numberless degrees by accompanying physiological conditions. The brain is an organ of power; power depends upon change, and change upon circulation; the lungs and heart are, therefore, immediately involved. To high and sustained mental power, ample lungs and a vigorous heart are essential. And these organs, again, fall back upon the digestive apparatus, which, if feeble, may impair the capacity of a good heart, sound lungs, and a well-constituted brain. Digestion, and even the caprice of appetite, thus stand in direct dynamic relation to intellectual results.

As the brain is more largely dependent than any other organ upon the torrent of blood which pours through it, we find that even a transient variation in the supply disturbs the course of thought. If a portion of the skull is removed, and pressure be made upon the brain, consciousness disappears, and the same thing occurs in fainting, from suspension of the circulation. With invigorated action of the heart, there is a general exaltation of the mental powers, while an enfeebled circulation depresses mental activity. Apoplectic congestion produces stupor and insensibility; inflammation of the grey substance causes delirium; while inflammation of the fibrous portion produces torpor and diminishes the power of the will over the muscles. In thus saying

that the state of the blood influences the mind, we do not use the term mind in any vague or abstract sense; we mean that it affects our views, opinions, feelings, judgments, actions. Change of circulation alters our mental pitch, and, with it, our relation to the universe. Dr. Laycock observes:—"In the earliest stage of general paralysis there is a feeling of energy. Everything, therefore, appears hopeful to the patient; large enterprizes, the success of which he never doubts, occupy his mind, and he rushes sometimes into the most extravagant and wasteful speculations. This is the stage of erethism of the capillaries of the part of the brain affected, when it is just sufficient to excite increased cerebral vigour. If, however, from any cause, this activity declines, so as to sink below par, a precisely opposite state of consciousness arises, and the patient may fall into a profound melancholy, and be insanely hopeless, distrustful, and anxious as to all events, past, present, and to come."* Even the variation in the quantity of blood which enters the brain, by simply taking the recumbent position, may affect mental activity in a marked degree. Persons who, through overexertion of mind, have impaired the contractility of the cerebral vessels, often become intensely wakeful after lying down, although very drowsy before, and sometimes can only sleep in the erect position. Dendy mentions the case of an individual who, when he retired to rest, was constantly haunted by a spectre, which attempted to take his life; though, when he raised himself in bed, the phantom vanished.

Persons have had their entire character changed by an apparently trifling interference with the circulation of

* Correlations of Consciousness and Organization. Vol. ii., page 325.

blood in the head. "A person of my acquaintance," says Dr. Hammond, "was naturally of good disposition, amiable, and considerate; but after an attack of vertigo, attended with unconsciousness of but a few minutes' duration, his whole mental organization was changed; he became deceitful, morose, and overbearing." Tuke and Bucknill mention the instance of a conscientious lady, who recovered from the brain-congestion accompanying small-pox with her disposition greatly changed. The susceptibility of conscience had increased to a state of actual disease, disturbing her happiness, and disqualifying her for the duties of life.

A blow on the head may produce marked mental derangement. The memory may be dislocated, events obliterated, and whole passages from the past life expunged: the faculty of speech may be partially or wholly destroyed, the memory of words confused, or entire parts of speech lost.

Mental perversions are also caused by certain changes in the properties of the blood. A fluid of amazing complexity, holding in exquisite balance the constituents from which the whole being is elaborated, all delicacies of feeling and niceties of thought depend upon its purity. "Polished steel is not quicker dimmed by the slightest breath than is the brain affected by some abnormal conditions of the blood."

If the poisonous products of bodily waste are not constantly swept from the system, the cerebral changes are disturbed and the mind stupified. Foods, drinks, and drugs affect specifically the appetites, passions, and thoughts. To become exhilarated and joyous, man charges his blood with wine; to exalt the sensations, he takes hashish; to secure a brilliant fancy and luxu-

rious imagination, he uses opium; to abolish consciousness of pain, he breathes vapour of chloroform. Swedenborg had a peculiar class of visions "after coffee." "A person I know," observes Dr. Laycock, "after taking morphine, in a fever, was haunted by hideously grotesque and fiend-like spectres; they then shortly changed into groups of comical human faces, and finally altered to forms of the human figure of the most classic beauty, and then disappeared." And this learned inquirer maintains that the pictorial productions of the insane vary in a definite order, the early stages of excitement enabling the artist to execute beautiful conceptions of figures and landscapes; then, as the disease advances, he passes into comic delineations, and ends with the grotesque, or hideous.

Those fluctuations of feeling with which all are more or less familiar, the alternations of hope and despondency, are vitally connected with organic states. In high health, the outlook is confident, there is joy in action, and courage in enterprise; but with a low or disturbed circulation, thin, morbid blood, and bodily exhaustion, there is depression of spirits, gloom, inaction, paralysis of will, and weariness of life. That variability of mental state which is so striking and general an experience with the literary and artistic classes, the periods when work is impossible, the moods of sluggish and unsatisfactory effort, the seasons of steady and successful accomplishment, and the moments of rare exaltation, capricious as they may seem, are but the exponents of varying constitutional conditions.

But the part played by the organism becomes still more apparent when we consider the mode of action of the nervous system in producing mental effects. It has been

stated that this system is composed of fibres and cells; hence the simplest conceivable case of nervous activity is where a cell and fibre become active, producing an excitement and a discharge; the highest action of the organ being nothing more than a complex system of excitements and discharges. In sleep, for example, a fly lights upon the face, producing an impression, or change, which causes a discharge along the nerves to the grey matter of the spinal cord. Here force is again liberated, which is discharged along another set of nerves upon the appropriate muscles, which, being contracted, bring the hand to the place where the fly settled. This is the course of power in a simple reflex action. But when the brain is called into conscious exercise in the higher processes of intellection just the same thing occurs. A person may be engaged in tranquil thinking, when one idea leads on to another in a natural train of association, that is, where the excitement of one state of consciousness is discharged into another, forming a succession of cerebral changes. In this quiet course of thought, a ludicrous idea, or a witty combination may arise, when a large amount of feeling, or nerve excitement, is suddenly awakened. This may be discharged in several directions. One portion may be spent upon the muscles of the face and chest, producing laughter; another portion may pass along the nerves leading to the stomach, perhaps stimulating digestion; and a third may be expended in producing other states of consciousness, or new trains of ideas. Mental action is thus manifested as definite and limited nervous action, and when we speak of the unfolding of mind, as in education, the fact signified is the growing adaptation of the brain and nervous apparatus to produce more and more

complex effects in accordance with their necessary mode of working.

The child comes into the world a little fountain of spontaneous power. For certain purposes its nervous mechanism is perfected, channels of discharge are open, connexions are ready formed, and reflex actions go on from the first. The infant also inherits the capabilities of its type; that is, the possibility of high development which belongs to man as distinguished from inferior creatures, and it also inherits the special tendencies and aptitudes of its particular ancestors. The order of the surrounding universe now begins to take effect upon it, and working within its organic limits, which of course vary widely in different cases, its education begins. Impressions pour in through the senses, and begin to open channels of discharge through the nerve centres. The child sees and desires an object, but has more or less difficulty in connecting the sensation with the movement necessary to seize it. By numberless efforts a nervous path is at length formed, and when a desirable object is seen, the sensation discharges upon the proper muscles, producing a suitable movement, and the hand grasps it. So with walking and speaking; by repeated exertions lines of nervous discharge are completed, and the sensations involved are co-ordinated with the movements of locomotion and utterance. Repetition strengthens association and facilitates action; that which is difficult at first, requiring a large expenditure of voluntary effort, at last seems "to go of itself." Upon this point Dr. Carpenter remarks, "There can be no doubt that the nerve-force is disposed to pass in special *tracks*, and it seems probable that whilst some are originally marked out for the automatic movements, others may be

gradually *worn in* by the habitual action of the will, and that thus when a train of sequential actions originally directed by the will has been once set in operation, it may continue without any further influence from that source." *

Thus, in committing to memory a poem, or in learning a piece of music, voluntary effort wears a path of association, so that each word or sound automatically suggests the next, and we can either repeat the words or hum the air in silence, or link on the automatic movements of expression: but by sufficient repetition the words and sounds become so closely associated, that when the first bar of the melody, or the first stanza of the poem is awakened, it will cost an effort to prevent running through with them. In this way, as the child grows to maturity, brain connexions are established between sensations, ideas, and movements; they become automatic and powerful, and give rise to fixed habits. Peculiarities of gait, attitude, gesture, and speech, and the iteration of set phrases, become partially automatic; their paths of discharge getting so deeply worn that repetition occurs involuntarily. The same thing is seen also in the higher region of ideas and beliefs. Long-established associations and opinions survive their rejection by reason: convince a man of his life-long errors to-day and he re-asserts them to-morrow, so strong is the tendency of thought to move in its long-accustomed cerebral tracks.

Now, when we experience a feeling, or think a thought, or determine an act, that is, in every case of excitement and discharge, there is a partial decomposition of the

* Principles of Human Physiology. Fifth Edition, page 699.

nervous structure in action. In every such act there is loss of energy, or partial exhaustion, the cells and fibres fall below par, and the equilibrium is restored by the nutrition of the weakened part. Brain-repair thus takes place, *in accordance with the modes of mental action*, and, as in the blacksmith's arm muscular nutrition is commensurate with its exercise, and augments power, so in every special kind of mental exercise, cerebral nutrition co-operates to raise the standard of nervous power. As waste accompanies exercise, and repair follows waste, the nutrition of the organ is determined by the modes of mental activity—given associations and ideas become patterns, as it were, in conformity to which the brain is moulded. In this way the organic processes re-inforce mental acquisition, and assimilation tends to perpetuate states of feeling and modes of thought and action. Throughout infancy, childhood, and youth, when nutrition is in excess, the brain is thus adapted to its circumstances, and *grows* to the order of impressions and ideas which it receives.

We have seen that the office of volition is to determine the course of thought and direct bodily actions to specific ends. This capability is the noblest element of our nature, but is greatly variable in different individuals by habit and constitution, and is inexorably limited in all. The will is not an absolute Despot, with unbounded authority to do what it lists, but rather a constitutional President, exercising vast power, it may be, but strictly subject to the laws of the organic state. Its regnant prerogative, as we have seen, is that of controlling the attention, by which it is enabled to wield the entire energy of the organism to the accomplishment of its purposes. In this way the automatic system becomes

a means of exalting the office of volition, and making it in an eminent degree the arbiter of individual destiny. But in the exercise of its prerogative the will is governed by the same great law which rules all the other powers, namely, the acquirement of strength by exercise. Only through that constant exertion by which energy is accumulated can the will gain command of the thoughts and mastery of the impulses. By continual practice the organism grows, as it were, into subordination, and the voluntary powers become habitually predominant. The will is thus, in an eminent degree, capable of education, but when we see how it is enfeebled in bodily debility and utterly extinguished in numerous morbid states of the system, it becomes apparent to what an extent physiological conditions must enter into the policy of its intelligent management. Even its limited freedom, as physicians well understand, is only coincident with healthy bodily action.

Sufficient, I trust, has now been said, to show that mental operations are so inextricably interwoven with corporeal actions, that to study them successfully apart is altogether impossible. The mental life and the bodily life are manifestations of the same organism, growing together, fluctuating together, declining together. They depend upon common laws, which must be investigated by a common method; and science, in unravelling the mysteries of the body, has thrown important light upon the workings of the mind. It only remains now to point out, that when subjected to the Baconian test of "fruitfulness"—of practical application to the emergencies of experience, the scientific method of regarding human nature, incomplete as it may be, already stands in marked contrast to the proverbial barrenness of the

old metaphysics. I will briefly refer to two or three such applications.

One of the gloomiest chapters of man's social history is that which records the treatment of the insane. Those upon whom had fallen the heaviest calamity possible in life, were looked upon with horror, as accursed of God, and treated with a degree of cruelty which seems now incredible. Asylums were dark and dismal jails, where their inmates were left in cold, hunger, and filth, to be chained and lashed at the caprice of savage keepers. And this barbarism continued in countries claiming to be enlightened down to the middle of the present century. Let me mention a solitary instance, of which the literature of the subject is full.

Said Dr. Conolly, in a lecture in 1847: "It was in the Female Infirmary at Hanwell, exactly seven years ago, that I found, among other examples of the forgetfulness of what was due either to the sick or insane, a young woman lying in a crib, bound to the middle of it by a strap around the waist, to the sides of it by the hands, to the foot of it by the ankles, and to the head of it by the neck; she also had her hands in the hard leathern terminations of canvas sleeves. She could not turn, nor lie on her side, nor lift her hand to her face, and her appearance was miserable beyond the power of words to describe. That she was almost always wet and dirty, it is scarcely necessary to say. But the principal point I wish to illustrate by mentioning this case is, that it was a feeble and sick woman who was thus treated. At that very time her whole skin was covered with neglected scabies, and she was suffering all the torture of a large and deep-seated abscess of the breast." "Again," he remarks, "old and young, men and women, the frantic and the melan-

choly, were treated worse and more neglected than the beasts of the field. The cells of an asylum resembled the dens of a squalid menagerie; the straw was raked out, and the food was thrown in through the bars, and exhibitions of madness were witnessed which are no longer to be found, because they were not the simple product of malady, but of malady aggravated by mis-management."

Now, these statements represent a condition of things as old as history, and we are called upon to account for it. Granting that the insane were dangerous, and required restraint, and granting all that may be urged concerning the barbarity of the times, we have yet to find the cause of the apparently gratuitous ferocity of which they were the victims; and this we do find in the legitimate consequences of the prevailing theory of human nature. The ancient philosophy taught that the body is to be despised, degraded, renounced. This view was adopted by theology, and thrown into a concrete and dramatic shape, which made it more capable of vivid realization by the multitude. It pronounced the body to be "a sink of iniquity," the "intrenchment of Satan," a fit residence for demons. The lunatic was one who had incurred Divine displeasure, and was given over to the powers of darkness, by whom he was "possessed." This doctrine, of which witchcraft was one of the developments, abundantly explains the attitude of society towards the victims of mental disorder. What more suitable than dungeons, scourgings, and tortures for the detested wretch, who was thus manifestly forsaken of God, and delivered over to the Devil? The merciless brute who inflicted untold sufferings upon these unhappy beings deemed himself, like the Inquisitor, but an instrument for executing the will of Heaven.

It availed nothing that, for thousands of years, there had been a broad current of intense and powerful thought in the channels of poetry, polemics, oratory, philosophy, politics, theology, and devotion. All this multifarious culture was powerless to arrest the evil consequences of a radically erroneous view of human nature, for the simple reason that the discovery of truth was not among its objects. It was only when a class of men, participating in the new spirit of modern times, and drawn to the investigation by the necessities of their profession, entered earnestly upon the study of the body, that views were reached which have revolutionized and humanized the treatment of the insane. Discovering that the mind is dependent upon the organism, and that its disordered manifestations are the results of organic derangement, they found that insanity is not a devil to be exorcised, but a disease to be cured. After a sharp struggle with popular ignorance and traditional prejudice, the better views have triumphed, and society is beginning to reap the beneficent consequences of their labours: the stern and violent measures, that served but to aggravate the malady, have given place to gentle and kindly treatment, which is found to be of itself a most potent means of restoration.

The management of the idiotic, or feeble-minded, equally illustrates the argument. Throughout the past no movement was made for the relief of this wretched class, and no one dreamed that anything could be done for them; but the progress of Physiology has made a new revelation in this field also. Dr. Edward Seguin, in his recent able work upon "The Treatment of Idiocy by the Physiological Method," observes: "Idiots could not be educated by the methods, nor cured by the treatment,

practised prior to 1837; but most idiots, and children proximate to them, may be relieved, in a more or less complete measure, of their disabilities by the physiological mode of education."

These facts have a profound significance. They not only show that to be *practicable* which the world had never suspected to be *possible*, and that science is true to her beneficent mission in the higher sphere as well as in the lower; they not only show that a change of method in the study of human nature ended some of the grossest barbarisms of the past, but they involve this deeper result—that by reaching a knowledge of the true causes of insanity and imbecility, we gain command of the means of their prevention, and arrive at the principles of mental hygiene. And this leads to the consideration of those wider consequences to society at large which the modern method of inquiry is beginning to produce.

This is perhaps best illustrated in the establishment of what may be called the law of *mental limitations*. The old contrast between matter and mind led to the growth of an all-prevalent error upon this point. To matter belongs extension or limitation in space; but mind is inextended, and therefore it has been inferred to be unlimited: being indefinite, it was supposed to be unbounded in its nature. But force also is inextended, although rigorously limited and measurable; and as mind is nothing more nor less than mental power, it must be subject to the laws of power, and work within quantitative limits, like any other form of force. Power, again, is but the accompaniment of material change, and is, hence, restricted in quantity by the amount of that change; and as mind is accompanied by cerebral

transformation, it must have a necessary limit in the quantity of cerebral transformation. In, therefore, considering man as a being in whom mind is conditioned by a bodily organism, the limitation of mental effects becomes a practical question of the very highest importance.

The doctrine of the conservation of energy and the mutual convertibility of the various forces, is now accepted as a fundamental truth of science. Nor is there any ground for regarding the vital forces as an exception to the principle. That the organism cannot create its own force, that its energy is entirely derived from the food ingested, and which, in this point of view, is merely stored force, is beyond question; and the source being thus limited, that its expenditure in one direction makes it impossible to use it in another, is equally evident. This principle applies, even in a more marked degree, to the cerebral system. Every one knows that hearty digestion and violent exercise lower the mental activity, that is, the forces are diverted from the brain, and thrown upon the stomach and muscles.

That the purely intellectual powers are also subject to limitation is unquestionable. All minds are fissured with incapacities in one direction or another,—clipped away on this side or on that,—all are fragmentary. There may be great mathematical ability, but no imagination; fine poetical gifts, without logical faculty; large executive power, coupled with deficient judgment. Dr. Whewell had a powerful memory for books, but a very bad one for persons; Sir William Hamilton cultivated the lore and history of philosophy, at the expense of his power of origination and organization; Prescott was so irresolute that he could only spur himself to his literary tasks

by the stimulus of betting with his secretary that he would do a certain amount of work in a given time; Theodore Parker was loaded with erudition, but exclaimed on his premature death-bed, "Oh, that I had known the art of life, or found some book, or some man to tell me how to live, to study, to take exercise." The greatest men are all dunces in something: Shakspeare and Newton illustrate the law as absolutely as the veriest weakling of the asylum. The full-orbed intellect is yet to come, and will doubtless bring with it the "perpetual motion," and the Jew's "Messias."

These phenomena find no explanation in the old hypothesis of mind as a vague, spiritual entity; they throw us back immediately on the organism whose acknowledged limitations offer at once a solution of the mystery. These mental inaptitudes may be either organic deficiencies, or a result of concentrating the cerebral energy in certain directions, and its consequent withdrawal from others. Thus viewed, every attainment involves the exercise of brain-power—each acquisition is a modification of cerebral structure. All sensations of objects and words that we remember, all acquired aptitudes of movement; the associations of the perception of things with visible symbols, vocal actions and sounds, the connexions of ideas with feelings and emotions, and the formation of intellectual and moral habits, are all concomitants and consequents of the only kind of action of which the brain is capable—are all the products of organic nutrition; and the rate and limit of acquisition, as well as the capacity for retention, are conditioned upon the completeness of the nutritive processes. As each acquirement involves a

growth, it is evident that acquisition may reach a point at which the whole organic force is consumed in conserving it, and further attainments can only be made at the expense of the decay and loss of old ones. Hence, if we overburden the brain, as in school-"cramming," nutrition is imperfect, adhesion feeble, and acquisition quickly lost.

The one great physiological law upon which bodily and mental health are alike dependent, is the alternation of action and repose which results from the limitation of power. The eternal equation of vital vigour is, *rest equals exercise.* That tendency to rhythmic action, which seems to mark all displays of power in the universe, is conspicuously manifested in the organic economy, allowing the muscles of respiration eight hours' repose out of twenty-four, and six hours' rest to those of the heart. The cerebral rhythm is diurnal: except that rest which parts of the brain may obtain when only other parts are in action, the organ finds its appropriate repose in sleep. "Half our days we spend in the shadow of the earth, and the brother of death extracteth a third part of our lives," says the eloquent Sir Thomas Browne; that is, the periodicities of cerebral action are defined by astronomic cycles; the brain and the solar system march together. Exercise and repose are equally indispensable to mental vigour; deficiency of exercise produces mental feebleness; deficiency of rest, disease. But there lurks in this statement a deeper and more dangerous meaning than at first appears. The equilibrium once lost is most difficult to restore,—there is a fatal persistence in the morbid state. It is a general law of the animal economy, that when the vital powers are, from any cause, depressed below a certain point, they

are not easily, and sometimes are never, repaired. A large loss of blood, or a profound exhaustion, may entail effects upon the constitution which will last for years, perhaps for life. As might be expected, the brain illustrates this principle more impressively than any other portion of the system: if worked beyond its limits, there is produced a rapid exhaustion of power which renders repose impossible. The exhaustion of over-work is accompanied by excitement, which tends to perpetuate the work and accelerate the exhaustion. The will is thus swamped in the uncontrollable mobility of the automatic system, the attention becomes insanely exalted, the brain will not be ordered to rest, and words of warning are wasted. When his physicians admonished Sir Walter Scott of the impending consequences of excessive mental labour, he sadly replied: "As for bidding me not work, you might as well tell Molly to put the kettle on the fire, and then say, 'now don't boil.'"

We live in an age of intense mental activity and ever-increasing cerebral strain. Steam and electricity are tasked to bring daily tidings of what is happening all over the world, and impressions pour in upon the brain at a rate with which nothing in the past is comparable. The fierce competitions of business, fashion, study, and political ambition, are at work to sap the vigour and rack the integrity of the mental fabric, and there can be no doubt that there is, in consequence, an immense amount of latent brain disease, productive of much secret suffering and slight aberrations of conduct, and which is liable, in any sudden stress of circumstances, to break out into permanent mental derangement. The price we pay for our high-pressure civilization is a fearful increase of cerebral exhaustion and disorder, and an augmenting

ratio of shattered intellects. We are startled when some conspicuous mind, strained beyond endurance, as in the cases of Hugh Miller, or Admiral Fitzroy, crashes into insanity and suicide, yet these are but symptoms of the prevailing tendencies of modern life.

And here I call attention to the deep defects of that predominant scheme of culture which not only ignores the human brain, and the sciences which illustrate it, as objects of earnest systematic study, but explodes upon it all the traditional contempt which it cherishes for material nature. "This hasty pudding within the skull," said Frederick Robertson, as he epitomized, in a single expression, the stupid prejudice of the prevailing "scholarship." Poor Robertson! smitten down in the midst of a noble career, by the consequences of over-tasking, dying of brain disease in the prime of manhood:—how cruelly did Nature avenge the insult!

Men admire the steam-engine of Watt and the calculating engine of Babbage; but how little do they care for the thinking engine of the Infinite Artificer! They venerate days, and dogmas, and ceremonials; but where is the reverence that is due to that most sacred of the things of time, the organism of the soul! We speak of the glories of the stellar universe; but is not the miniature duplicate of that universe in the living brain a more transcendent marvel? We admire the vast fabric of society and government, and that complicated scheme of duties, responsibilities, usages, and laws which constitutes social order; but how few remember that all this has its deep foundation in the measured march of cerebral transformations. We point to the inventions, arts, sciences, and literatures, which form the swelling tide of civilization; but were they not all

originated in that laboratory of wonders, the human brain? Geological revelations carry us back through durations so boundless, that imagination is bewildered, and reason reels under the grandeur of the demonstration; but through the measureless series of advancing periods, we discover a stupendous plan. Infinite Power, working through infinite time, converges the mighty lines of causality to the fulfilment of an eternal design,—the birth of an intellectual and moral era through the development of the brain of man, which thus appears as the final term of an unfolding world,—an Institution of God for working out the destiny of a planet!

The ultimate and decisive bearing of the foregoing views upon plans and processes of instruction, can hardly fail to have been perceived. The scientific method of studying human nature, important as may be its relation to the management of the insane and feeble-minded, and valuable as is its service in establishing the limits of mental effort, must find its fullest application to the broad subject of education. For, whatever questions of the proper subjects to be taught, their relative claims, or the true methods of teaching may arise, there is a prior and fundamental inquiry into the nature, capabilities, and requirements of the being to be taught, upon the elucidation of which all other questions immediately depend. A knowledge of the being to be trained, as it is the basis of all intelligent culture, must be the first necessity of the teacher.

Education is an art, like Locomotion, Mining, or Bleaching, which may be pursued empirically or rationally, as a blind habit, or under intelligent guidance; and the relations of science to it are precisely the same as

to all the other arts—to ascertain their conditions, and give law to their processes. What it has done for Navigation, Telegraphy, and War, it will also do for Culture. The true method of proceeding may be regarded as established, and many important results are already reached, though its systematic application is hardly yet entered upon. Although there is undoubtedly a growing interest in the scientific aspects of the subject, yet what Mr. Wyse wrote twenty-five years ago remains still but too true. He says, "it is, unquestionably, a singular circumstance, that, of all problems, the problem of Education is that to which by far the smallest share of persevering and vigorous attention has yet been applied. The same empiricism which once reigned supreme in the domains of chemistry, astronomy, and medicine still retains possession, in many instances, of those of education. No journal is kept of the phenomena of infancy and childhood; no parent has yet registered, day after day, with the attention of an astronomer who prepares his ephemerides, the marvellous developments of his child. Until this is done, there can be no solid basis for reasoning; we must still deal with conjecture." And why has nothing been done? Because, in the prevailing system of culture, the art of observation, which is the beginning of all true science, the basis of all intellectual discrimination, and the kind of knowledge which is necessary to interpret these observations, are universally neglected. Our teachers mostly belong to the old dispensation. Their preparation is chiefly literary; if they obtain a little scientific knowledge, it is for the purpose of *communicating* it, and not as a means of tutorial guidance. Their art is a mechanical routine, and hence, very naturally, while admitting the importance of advancing views, they really

cannot see what is to be done about it. When we say that education is an affair of the laws of our being, involving a wide range of considerations,—an affair of the air respired, its moisture, temperature, density, purity, and electrical state; an affair of food, digestion, and nutrition; of the quantity, quality, and speed of the blood sent to the brain; of clothing and exercise, fatigue and repose, health and disease; of variable volition, and automatic nerve action; of fluctuating feeling, redundancy and exhaustion of nerve-power; an affair of light, colour, sound, resistance; of sensuous impressibility, temperament, family history, constitutional predisposition, and unconscious influence; of material surroundings, and a host of agencies which stamp themselves upon the plastic organism, and reappear in character; in short, that it involves that complete acquaintance with corporeal conditions which science alone can give,—when we hint of these things, we seem to be talking in an unknown tongue, or, if intelligible, then very irrelevant and unpractical.

That our general education is in a deplorably chaotic state, presenting a medley of debased ideals, conflicting systems, discordant practices, and unsatisfactory results, no observing person will question; that this state of things is to last for ever, we all feel to be impossible; and that its future removal can only come through that powerful instrumentality to which we owe advancement in other departments of social activity, is equally clear to the reflecting. The imminent question is, how may the child and youth be developed healthfully and vigorously, bodily, mentally and morally; and science alone can answer it by a statement of the laws upon which that development depends. Ignorance of these laws

must inevitably involve mismanagement. That there is a large amount of mental perversion, and absolute stupidity, as well as of bodily disease, produced in school, by measures which operate to the prejudice of the growing brain, is not to be doubted; that dulness, indocility, and viciousness, are frequently aggravated by teachers, incapable of discriminating between their mental and bodily causes, is also undeniable; while, that teachers often miserably fail to improve their pupils, and then report the result of their own incompetency as *failures of nature*, all may have seen, although it is now proved that the lowest imbeciles are not sunk beneath the possibility of elevation.

The purpose of the foregoing remarks has been to bring forward an aspect of man which cannot fail to have an important influence upon processes of instruction. I have endeavoured to illustrate the extent to which Nature works out her own results in the organism of man. The numerous instances of self-made men, who, with no external assistance, have risen to intellectual eminence, and the still more marked instances where students have forced their way to success in spite of the hindrances of an irrational culture, testify to the power of the spontaneous and self-determining tendencies of human character, while the general overlooking of this fact has unquestionably led to an enormous exaggeration of the potency of existing educational methods. In establishing this view, science both limits and modifies the function of the instructor. It limits it by showing that mental operations are corporeally conditioned, that large regions of our nature are beyond direct control, and that mental attainment depends in a great degree upon inherited capacity and

organic growth. It limits it by showing that ancestral influences come down upon us as we enter the world, like the hand of Fate; that we are born well, or born badly, and that whoever is ushered into existence at the bottom of the scale, can never rise to the top because the weight of the universe is upon him. It shows how not to mistake the surface effects of an ostentatious system for a thorough in-forming of character; how not to mistake the current smattering of languages, the cramming for examinations, the glossing of accomplishments, the showy and superficial pedantries of literature, and the labelling of degrees, for true education.

The office of the teacher is thus narrowed but not denied. If inherited organization is a factor of destiny never to be cancelled, there is another factor in that culture which rests upon a knowledge of the laws of life and character. Science modifies the tutorial offices by disclosing the direction of its real work, and guarding against waste of effort, and specious and spurious results —by showing that education does not consist in the acquisition of knowledge to be siphoned into the intellectual receivers of the school-room, but is rather to direct the working of a mechanism over which neither its owner nor his teacher is omnipotent—a mechanism in which effects follow causes, and which always operates according to law. It shows the Instructor that he must take his pupil as he finds him; not a mental abstraction, to be classed with other "minds" and worked by a universal formula, but a personal reality—a part of the order of nature which never repeats itself in a single case; a being with individual attributes which are inexorably bound within the limits of his organization. It therefore demands of him to leave the lore which is glorified by

tradition until he has thoroughly grounded himself in the elements of that knowledge of human nature—of the springs of action and the conditions and possibilities of real improvement, which alone can confer the highest skill in quickening the intellect, and moulding the character.

I have thus attempted to prove that only by inverting the rule of the past, which exalted the mind at the expense of the body, and bringing the resources of modern induction to the study of the corporeal organism, can we arrive at that higher and clearer knowledge of man, which will make possible anything like a true Science of Human Nature. I have pointed out the salutary results which have already flowed from this method in the crucial test of the treatment of the insane; and the vast benefits which society cannot fail to reap from that clearer perception of the laws of vital and mental limitations which recent research has so decisively established; and I have also endeavoured to unfold the bearing of this view upon the subject of education. But the results enumerated are far from exhausting the broad applicability of the method. The grand characteristic of science is its universality; what is it, indeed, but the latest report of the human mind on the order of nature? Its principles are far-reaching and all-inclusive, so that when a knowledge of the true constitution of man is once attained, it confers insight into all the multitudinous phases of human manifestation. The same economy of power which science confers in the material world, and by which we obtain a maximum of effect from a minimum of force, she confers also in the world of mind. When we have mastered the laws of physical education we have the essential data for dealing

with questions of mental education, and these steps are the indispensable preparation for an enlightened moral education. And the same knowledge of the organism which shows how it may be best developed, gives also the clue to the understanding of its aberrant phenomena. That mysterious ground which has hitherto been the hot-bed of noxious superstitions and dangerous quackeries, is reclaimed to rational investigation, and the remarkable effects of reverie, ecstasy, hysteria, hallucinations, spectral illusions, dreaming, somnambulism, mesmerism, religious epidemics, and other kindred displays of nervous morbidity, find adequate explanation in the ascertained laws of our being. This kind of knowledge is, furthermore, not only of the highest value to all classes for practical guidance, but the philosophical students of man, whether viewing him in the moral, religious, social, æsthetic, ethnological or historic aspects, must find their equal and indispensable preparation in the mastery of the biological and psychological laws which can alone explain the nature of the subject of their research.

After what has been said, it will not be supposed that I entertain any very extravagant expectations of the immediate results to be obtained from improved methods of dealing with human nature. On the contrary, one of the most impressive lessons of science, is that permanent growths are slow, and that there are limits which cannot be overpassed. Dealing largely with causes which only work out their results in the fulness of time, it teaches patience, hope, and labour; and not the least of its salutary influences will be, through wholesome discipline of the imagination, and a rational control of the sympathies, to check the waste of power upon impossible projects, and restrain those enthusiasms which are born

of the feelings rather than of the judgment. Nor do I believe that the perfectibility of the human race is at hand through the teaching of a little more physiology in schools, or that science is to apply a calculus to human actions, and thus supersede the common sense and practical judgments of mankind. That there is a vast body of valid knowledge concerning the nature of man, which is reduced to application, and serves for the management of conduct, is shown in all the multifarious aspects of social activity: I simply hold that this knowledge, valuable as it is, is yet imperfect—in many respects deplorably imperfect—and must grow to a higher state and a more scientific character; and that the organized culture of the present age is bound to help and not to hinder this tendency. The time, I think, has come for demanding that the curriculum of modern liberal education be so reconstructed that its courses of study shall have a more direct and positive bearing upon that most desirable end—a clearer understanding of the Laws of Human Nature.