

THE FEELINGS AND THE WILL, VIEWED PHYSIOLOGICALLY.

THE question is often asked,—“What bearing has the study of the physical accompaniments of mind on our knowledge of mind proper?” To this it may be answered :—

First. That if mind proper is, in every one of its functions, uniformly accompanied by movements and other material processes, there is a great likelihood that its peculiarities are determined and controlled by such accompaniments. If two facts, A and B, are constant companions; and if we were very much interested in knowing A, we should not neglect to study B. When the ultimate nature of luminous action is inquired into, the circumstance is not overlooked that a body becomes luminous on attaining a high degree of heat.

Secondly. The limitation of mind by laws of the material world is a truth but lately recognised in its full extent, and forced upon the world not by mere metaphysicians, but by the phrenologists, and a very small number of physiologists, who made it their business to illustrate the connection between the mind and the brain. From this tardy recognition we have already derived two great practical benefits: one as regards the treatment of the insane, the other as regards a due moderation in working the mind.

And *Thirdly.* It might be made apparent that all the great laws that have been discovered regarding the structure and action of the brain and nerves—the discovery of Bell, for example—do impress their character upon the workings of the mind. Indeed, I consider that most of the valuable suggestions, lately introduced into mental philosophy, have come not through the sole method of introspective consciousness, but through a consideration of the nervous structure. I say this emphatically with reference to what I consider the sound theory of the Will.

The strong facts relied upon as showing that the concomitance of mind and body is not occasional or partial, as always admitted, but thorough-going and complete, are such as these :—In the first place, we have the appearances known in all ages and countries as the Expression, or natural language, of the feelings. The smile, the puckering of the features, the frown, the trembling of fear, the stare of astonishment, are so constant that we reckon them as part of the emotions that they indicate. If a feeling arise in the mind without its natural expression, we account for the circumstance either by its being too feeble, or by voluntary suppression. With this explanation, no state whatever is exempt from the tendency to outward display.

Another argument of great force is found in the often-noted connection between size of brain and mental energy, which, notwithstanding some slight deviations from the strict concomitance, is too marked to be explained away. And, lastly, I will allude to a few of the remarkable facts showing the connection between our thoughts and our feelings, and the nutrition, or the supply of blood to the brain. The arrest of the circulation, by stoppage of the heart, or by pressure on the head, is followed by loss of consciousness. On the other hand, excessive rapidity of the circulation quickens the thoughts, and raises the feelings up to the pitch of delirium. These facts regard the *quantity* of the blood; another class point to the influence of *quality*, or of the ingredients composing it. Excess of carbonic acid, from deficient action of the lungs, causes loss of consciousness. So any of the other impurities that the purifying organs should remove, as urea, depresses or destroys mental function. Poisons that act through the nervous system suspend the consciousness. Then, as regards depressing or extinguishing agencies, on the other extreme, the vigorous exercise of the lungs and of all the other purifying organs, abundance of food, and the stimulants, alcohol, tea, opium, &c., import a high tone of exhilaration to the mind by affecting the constitution of the blood.

The nervous system, as to its outward form and appearance, is a central mass of peculiar matter; and a branching system of cords or threads proceeding from the central mass to all the organs of the body—the senses, the muscles, the viscera, and so on. The central mass—a huge rounded mass (the brain), upon a stem or column (the spinal cord)—when cut into, is of two shades of colour, a pale white and an ashy grey, and the portions so coloured are named respectively the *white* substance and the *grey* substance. Under the microscope, the white substance resolves itself into very minute fibres, and all the branching cords or threads are of this substance. The grey substance, again, resolves itself into a mixture of fibres and *cells*; and it is the presence of these cells that distinguishes the grey substance wherever it is found. Thus, then, we have two ultimate elements to deal with—the *fibre* and the *cell*. A word on each.

Two facts are enough on the fibre:—(1) Their *size* or thickness. This ranges from the $\frac{1}{15000}$ -th, the $\frac{1}{30000}$ -th, the $\frac{1}{150000}$ -th, the $\frac{1}{500000}$ -th, even to less than the $\frac{1}{1000000}$ -th of an inch. Abiding by the larger range, we might have, in a rod of matter an inch thick, from ten to one hundred millions of fibres. (2.) Their *position*. This is always a *completed* connection between the extremities of the body and the cells of the grey matter, or between one cell and another of the central lump: no loose ends, and no indiscriminate position. The fibres are thus a connecting or conducting material.

Next as to the cells. They are rounded, pear-shaped, or irregular little bodies, and are supposed to give origin each to two or more

threads or fibres. Their minuteness is also great. They range as high as the $\frac{1}{300}$ th of an inch, and as low as the $\frac{1}{12000}$ th.

Of their function, two things :—

1. Being well supplied with blood, they are reckoned to give forth *force*, power, or energy to the connected nerves, or at all events to reinforce and increase the nervous energy for putting the system into action. It seems unwarrantable to draw a broad line in this respect between the two elements of fibre and cell, which are apparently homogeneous in their constituent material, as well as operating in the same way under nutrition and stimulation. At all events it has been customary to regard these little bodies where the fibres terminate, as especial sources of energy or power, and to style the grey masses of the brain and spinal cord, where they occur, the nervous centres.

2. But there is a second function attaching to them, which I must look upon as a key to the whole plan of the brain. Assuming that one class of nerve fibres (sensory, efferent, incarrying)—those distributed to organs of sense and viscera, for example,—are employed in conveying influence from without inwards, and another class (motory, afferent, outcarrying) distributed to muscles, in carrying influence from within outwards, we find that the two classes are nearly always mixed together in the same bundles and in the same common stem of white matter in the spinal cord. Let us, however, imagine the two classes separated, the sensory nerves all emerging from the centres at one side, and the motory nerves at the other side, we can then express the plan of the brain thus :—The sensitive or incarrying fibres come up, and begin to drop into cells; from these cells other fibres arise and proceed inwards to other cells, and so on. But mark now the enormous connecting mass of fibres that makes up the white matter of the brain, and consider by what process of multiplication this has grown up. There is only one way that is compatible with our views of nerve structure. For one fibre coming up from the sense organs and dropping into a cell, two, three, four, five, or more must emerge; and each of these again, proceeding onwards to a new cell, must be replaced by other three, four, &c.; and so on, until the requisite multiplication has been attained. In the spinal cord, where there is no increase of bulk, this multiplying process is not apparent, but in the junction of the cord with the brain, such must, from mere arithmetical necessity, be the method pursued. For every fibre coming up from the senses, and every fibre going out to the limbs and moving organs, there must be perhaps ten thousand, perhaps a hundred thousand, traversing the brain, involving a great and rapid multiplication in the progress through the cerebral substance.¹

(1) It is impossible to avoid the supposition that the *corpora strata* and the *thalami*

Thus then the cells, besides being Centres of Force, are the Grand Junctions or Crossings, where the fibres extend and multiply their connections; enabling us, so to speak, by drawing one string to pull a great many. The import of the arrangement will appear afterwards. And now a few words as to the Nervous Action.

Prior to the great discoveries in Electricity there was scarce even an illustrative analogy for the mode of action of the nerves. Hartley adduced the transmission of sound as the only phenomenon that he could light upon to represent what passed in sensation. But Electricity has made us familiar with a far subtler, although difficult to be conceived, mode of action than the vibrations of a sounding body. We see a force liberated at one point, as in the voltaic cell, transmitted along a wire to operate or discharge itself at another point, as in magnetising a bar, or in the needle of the telegraph. Of this current nature is the Nerve Force. The material for generating it is in the blood that flows to the cells and to the fibres; and when generated it is conveyed to the extremities of the motor nerves, and is discharged either in stimulating muscles into action outright, or in keeping up a great many currents merely tending to movements in the inner life of thought and feeling.

The nerve force, even if generically it were enrolled as one of the great Electric group, would probably be reckoned a distinct species in consequence of its peculiarities. For one thing, the nerve fibre is very unlike a wire employed in an electric circuit; it conducts more slowly (only at the rate of 200 feet per second), and its own substance is consumed in maintaining the current. And for another thing, the currents are caused, not only by supplying material, that is, *blood*, but by pinching, squeezing, heating, cooling, chemically irritating the nerve. The beginning of a sensation of touch or of hearing is a compression of the fibre; and under the very same supply of blood the energy of the current rises with the force of the compression; it being presumable that the blood is drawn upon for the force that the stimulation has awakened. In short, sensation presents the draft and the blood must honour it.

I proceed to the consideration of the most general laws hitherto arrived at respecting the connection of mind with physical or bodily processes. I reserve for a subsequent historical sketch the metaphysical questions as to the nature of mind, and here assume that mind and matter are distinct and even contrasted properties, yet found in the most intimate alliance.

Mind is now generally admitted to have a three-fold function, expressed by Feeling, Will or Volition, and Intellect or Thought. These are a kind of trinity in unity, for, although characteristic

optici, through which the great stem of the brain diffuses itself in the white matter of the hemispheres, are principal media of this indispensable multiplying process.

in their several manifestations, they are so dependent among themselves, that one could not be destroyed without the destruction of all.

Let us begin with Feeling, or the Feelings. We all know what pleasure and pain are, and we are aware of being sometimes in states of excitement that are not exactly the one or the other. Feeling, in the first place, is being mentally alive, the opposite of *unconsciousness*, as in a swoon, or in dreamless slumber; and in the second place, it is opposed to operations of a purely *intellectual* kind, as remembering, judging, casting up accounts, comparing, classifying, reasoning.

What, then, are the known concomitants of Feeling? I will give as the first position a statement of the most fundamental fact of our mental nature, and will advert to the physical bearings of that fact. I mean what is termed the law or principle of relativity.

I. Law of RELATIVITY (applies to Feeling and to Thought).

1. On the *Mental Side*; Change of Impression is essential to Consciousness. According to this law, the feeling of warmth is not an absolute, independent, or self-sustaining condition of mind, but the result of a transition from cold; the sensation of light supposes a transition from darkness or shade, or from a less degree of illumination to a greater. Hobbes said long ago, "It is almost (he should have said *altogether*) all one for a man to be always sensible of one and the same thing, and not to be sensible at all of anything."

The importance of this principle corresponds with the universality of its range. People are generally aware that the first shock of transition from sickness to health, from poverty to abundance, from ignorance to insight, is the most intense, and that, as the memory of the previous condition fades away, so does the liveliness of the enjoyment of the change. The blessings of leisure, retirement, and rest, are pleasant only by contrast to previous toil and excitement, the incessant demand for novelty and change, for constant advances in wealth, in knowledge, in the arrangements of things about us, attest the existence and the power of the law of Relativity in all the provisions for enjoyment. It is a law that greatly neutralises one part of the advantages of superior fortune, the sense of the superiority itself; but leaves another part untouched, namely, the range, variety, and alternation of pleasures.

It is beyond my present limits to show how the principle of Relativity appears in all the Fine Arts under the name of Contrast, how it necessitates that in science and in every kind of knowledge there should be a real negative to every real notion, or real proposition: straight—curved; motion—rest; mind—extended matter or extended space; how, in short, knowledge is never single but always double, or two-sided, though the two sides are not always both stated. I must be content with this very brief illustration of the principle itself, and now advert to the physical counterpart.

2. On the *Physical Side*. The nervous equilibrium, disturbed by the application of a stimulus at any one part, is perpetually restoring itself. This I admit to be a hypothetical rendering of the physical circumstances accompanying Relativity, deriving its support as an hypothesis from the analogy of what happens when any complex arrangement is disturbed. Opposing forces cause motions to take place until such time as they are all exactly balanced, which is the state of repose and equilibrium. Thus it is that a rush of water into one end of a reservoir, makes a movement over the whole surface till the level is restored.

Reasoning upon this analogy, it is fairly presumable that when all the currents of the brain are equally balanced, and continue at the same pitch,—when no one is commencing, increasing, or abating,—consciousness or feeling is null, mind is quiescent. A *disturbance* of this state of things wakens up the consciousness for a time; *another* disturbance gives it another fillip, and so on; the variety of stimulus in the waking state forbidding the perfect equilibrium from being attained. In harmony with this supposition is the really fitful nature of mind; the stream of consciousness is a series of ebullitions rather than a calm or steady flow. The calmness that we actually experience belongs to a low or moderate excitement; let there be any considerable intensity of feeling, and the ebullition character will start out convincingly prominent.

A second law of the physical connections of Feeling may be expressed thus:—

II. Law of DIFFUSION. When an impression is accompanied with Feeling, the aroused currents *diffuse* themselves freely over the brain, leading to a general agitation of the moving organs as well as affecting the viscera muscles and viscera.

Illustrative contrast.—The so-called Reflex actions (breathing, &c.) are commonly said to have no feeling, and their stimulation lies through a confined channel.

Note of explanation.—It is not meant that every fibre and cell of the brain can be affected at one moment, but that a spreading wave is produced enough to agitate the whole active system.

Let me begin the illustration from the fact given by way of contrast. The Reflex actions are known to be stimulated through the spinal chord, *medulla oblongata*, and parts closely allied, and not from the mass of the brain; they do not possess the large many-fibred circuit of the hemispheres. Then the response in their case is to the single organ engaged in the work to be done; to the chest, in breathing; to the intestines, in the propulsion of the food. As a familiar example of the class, if we touch the palm of any one asleep, we shall probably see the hand curl up. This is reflex, it is unconscious, it is stimulated from the chord, or from some centre short of the general brain. A current has been directed inwards to this centre; there is

no diffusion ; there is only a limited, an isolated response, to the flexor muscles of the fore-arm.

Contrast now what happens in a shock, say of acute pain, as from a severe smart, or a wound in the same organ. A reflex influence would still operate, and give birth to movements of the arm ; but these would be a small part of the case. The bodily members everywhere are put in motion ; the features are contracted with a well-known expression ; the voice sends out a sharp cry ; the whole body is thrown into agitation. Nor do the effects stop with mere muscular movements ; the face is flushed, showing that the circulation is disturbed ; the breathing is quickened, or the reverse ; a temporary loss of appetite proves that the gastric secretions in the stomach are perverted ; the skin is deranged ; and in the feminine constitution it would appear as if the mother's milk were turned into gall. It is apparent that to cause this wide circle of effects, the influence of the shock, the nerve currents set on, must be not merely intense in degree, but highly diffused in their course through the brain ; being thus able to get at and to actuate the general system of out-carrying nerves.

I have taken an extreme case to present the law in its utmost prominence. We might vary the illustration, and show that according to the strength of a feeling is *the extent of the diffusion*, as well as the intensity of the diffused manifestations. But the rise and fall of the two, in steady concomitance, is among our most common experiences ; indeed, our principal means of interpreting the strength of one another's feelings is derived from this uniformity. It would also be easy to prove that the apparent exceptions to the law are not real exceptions ; that in very mild states of feeling, or under a faint degree of excitement, the diffused wave is not strong enough to excite the muscles to an open display ; that the will may suppress the display, that it may be suppressed by habit ; that when the system is so strongly pre-engaged by another influence as to resist a new diffusion impressions are not felt (as in the insensibility to wounds in a battle). I will not dwell on these illustrations, and will add merely a reference to the operation of habit in deadening the feeling that accompanies our action, to show that wherever this deadening influence has occurred the diffused wave is proportionably contracted and suppressed. In our first attempts to write, to cipher, to play on an instrument, to speak, or in any other work of mechanical skill, the inward sense of labour and difficulty is corresponded to by the number of awkward and irrelevant gesticulations. In the last stage of consummated facility and routine, the consciousness is almost nothing ; and the general quietude of the body demonstrates that the cause of power has now become narrowed to the one channel necessary for the exact movements required. This is a sort of educated imitation of the primitive reflex movement adduced at the outset ; the comparison is

so striking as to suggest to physiologists the designation of secondary reflex, or automatic, for the habitual movements. A man at a signal post, after long habit, is subjected to little or no nervous influence, except on the single thread of connection between a certain figure depicted on the eye and a certain movement of the hand; the collaterals of the primitive wave have died away, and the accompanying consciousness has fallen to a barely discernible trace.

So far the Law of Diffusion has in it nothing speculative; it is only a general expression of the facts. Various speculative renderings or interpretations may be put, and have been put upon it. By combining the two laws—Relativity and Diffusion—we should obtain the following statement of the most general physical condition of consciousness:—

An increase or diminution of the nerve currents circulating in the brain, sufficiently diffused to affect the combined system of out-carrying nerves (to muscles and viscera).

Mr. Lewes has maintained that consciousness, with purpose, or will, belongs to the spinal chord, and the so-called Reflex Actions, as well as to the brain, and the highest form of our activity, there being no good grounds for denying sensibility to any nerve centre (“Physiology of Common Life,” chap. viii.). His facts and arguments in favour of this view seem to me very convincing; but they do not militate against the principle of Diffusion as above explained, but merely give another mode of expressing the same phenomena. It is still true, that in proportion to the diffusion through the nervous system (the amount of nervous matter actuated), is the degree of the consciousness. The Reflex, or spinal, consciousness would be admitted by Mr. Lewes to be comparatively feeble. Nay more: he would also admit, as being in full accordance with his principles, that this consciousness, so far as self-contained and complete for its own sphere, is detached from the cerebral or centralised consciousness, which we call our mind, being what we can be interrogated upon. If the spinal consciousness, and the sensibility of the sympathetic ganglia, mingle with the general tone of feeling, they become to all intents cerebral, and are known by the organs of expression and of voluntary movement that are ministerial to the brain and its sensibility. Our mental history must still be the successive phases of the cerebrum. The sleeper that, when cold, “turns and seeks a warmer spot,” or “stretches out his hand and pulls up the bed-clothes,” retains no record of those transactions, albeit they involve the essentials of feeling and will. The distinction between the spinal or reflex operations and the cerebral must be retained, after Mr. Lewes’s explanation, although in an altered form.

III. We are now, finally, to consider the physical foundations of

that radical contrast of our feelings—pleasure and pain. The opposition of the two is of that total kind—like plus and minus, debt and credit—that some one condition, according to its presence or absence, ought to account for both. Without delaying to quote the various theories of pleasure I will proceed at once to state what I deem the most tenable view.

1. States of *pleasure* are connected with an *increase*, and states of *pain* with a *diminution*, of some or all of the vital functions. This principle resumes a very large department of the known facts; the pleasure of healthy exercise and of rest after toil, the pain of excessive fatigue; the pleasure of nourishment, pure air, a good circulation, and the adjuncts of health; the pains of hunger, thirst, suffocation, hurts, and disease in general. There are some apparent exceptions in this class of healthy and unhealthy agents; the chief, perhaps, is Cold, which may be painful and yet salutary. This exception, however, supplies an instructive commentary to the rule. Cold really depresses, for a time, one organ, the skin, and perhaps also the digestive organs: on the other hand, it exalts, through the capillary circulation, the lungs, the heart, and the muscular and the nervous tone; and the contrast reveals to us that, as far as immediate pleasure is considered, it is more important to preserve the functions of the skin and the stomach than to exalt the lungs, the heart, or the muscles. The same view would explain another exception, namely, why the sick bed is not necessarily a place of discomfort; it is that the feebleness does not always attach to the more sensitive organs.

The general principle, connecting pleasure with vital force, deserves further confirmation from the outward displays under pleasure and under pain; the animation, stir, and vigour under the one, and the drooping and collapse attendant on the other. The spasmodic energy accompanying acute pain is no valid exception: it only proves that a momentary stimulation is possible under an acute shock; for we know that the subsequent stage realises all the vital depressions belonging to pain generally, with the superadded loss due to the violence of the convulsive movements.

Another curious exception that puzzled the great physiologist, Müller, of Berlin, and had been left unsolved by Sir Charles Bell, is there being certain movements specific to the expression of pain; for example, the corrugation of the eyebrows, and the contraction of the mouth, and the depression of the angles of the mouth. It would seem from such appearances, that instead of one of the opposed states being the presence of something absent in the other—vital energy, or whatever else—the two operate in the same way, and merely touch different strings, or send out power in different directions. But we may solve the difficulty thus: The muscles

brought into play under painful depression are generally muscles of small size or *calibre*, and their contracting makes the relaxation of larger muscles more complete. A certain slight exertion of the muscle that corrugates the eyebrows, perfects the relaxation of the more powerful muscle of the scalp that raises the eyebrows; a small stream of energy in the orbicular of the mouth assists the zygomaticus and buccinatus in relaxing themselves to the full. By a slight exercise of the muscles that bend the body and the limbs, we can carry the relaxation of the extensors (the really energetic muscles) much farther than we could do by the voluntary suspension of their own stimulus. By the employment of a small force, we may be supposed to release a greater quantity; so that, after all, the positive exertion of those muscles operating under pain merely aids in the renunciation of muscular energy on the whole. I venture, therefore, to assign as the reason why a forced "sadness of the countenance makes the heart better," is that by the employment of a stimulus we more thoroughly abate the stimulation of the moving organs at large, and allow blood and nervous force to pass to the enfeebled viscera—the digestion, the lungs, the heart, the skin—by whose amelioration the mental tone is most decisively improved. An examination, after Sir C. Bell, of the two great convulsive outbursts—Laughter and Sobbing—would still further confirm the same law: Laughter, with its collaterals, signifying the accession of vital force; the other, with its collaterals, a deprivation of vital force. But I pass on.

2. The stimulation of the nerves with a due regard to their condition as to nourishment is pleasurable; to pass this limit, painful.

I have already made a passing remark that the mere presence of nourishment, that is, blood, does not evoke all the nervous activity that the blood can pay for; the case is rather, that the blood yields up force at the instance of stimulation from without. Now this stimulation in the proper degree is connected with pleasure, and there is a degree that is painful—both points varying with the condition of the individual.

If we commence the illustration from the side of Pain, we may note as the two leading circumstances, (1) Conflict and (2) Intensity.

First. To say that all *conflicting* stimulations are painful, is merely to state a consequence of the former position. Conflict is waste of vital power, and is likely to be accompanied by a depression of the mental tone. This simple and obvious maxim sums up a wide experience; it includes the pleasures of harmony and the pains of discord; the pleasures of a free scope to all our impulses; the pains of constraint, obstruction, and thwarted aims; the pleasure of discovering similarity, agreement, consistency, and unity among things; the pains of inconsistency and contradiction.

Secondly. As regards Intensity. Violent, excessive, and sudden stimulations induce pain on various grounds. In opposition to the law that connects pleasure with vital energy, they cause a momentary exhaustion of the power of the nerves affected; and they may further be considered as originating a conflict with the prevailing currents of the brain, which do not adjust themselves at once to the new impetus. Thus though, on the general principle of relativity, they waken up a strong feeling, they sin against the conditions of *pleasurable* feeling.

Conflict and violence, then, are two principal modes of painful stimulation, and explain a very considerable number of our pains. In most, if not in all, of the painful sensations of three of the senses—namely, Touch, Hearing, and Sight—the pain is either discord or excess. The smarting acuteness of a blow on the skin, of a railway whistle close to the ear, of a glare of light, are due to the mere degree or excess of the stimulus. In hearing and sight, we have also the pains of discord. In the two remaining senses, Taste and Smell, we cannot make the same affirmation. We do not know what is the mode of nervous action in a bitter taste, as quinine or soot; and we cannot say that the transition from sweet to bitter is a transition from moderate stimulus to an excessive one. It may be that the power of the nerve is exhausted under a different kind of influence from mere violence of stimulation; but no certain knowledge exists on the subject. The same remarks apply to smell.

These observations on the *negative* aspect of stimulation—the aspect of pain—contain by implication the positive aspect. Stimulation, as such, is pleasurable. “Man loves sensation,” said Aristotle. For the eye to see, for the ear to hear, for the skin to touch, are in themselves joyful. We cannot affirm, with respect to the ordinary gratification of the five senses, that they increase vitality,—they may do so slightly; we can say only that they draw upon the vitality to maintain nerve-currents that give pleasure. It is agreeable to spend a certain portion of the forces of the system in nervous electricity; it is not agreeable to push this expenditure beyond a certain point. And when the stimulation has passed this point, degenerating into pain, the pleasurable tone can be restored only by replenishing the vitality, according to the principle that connects pleasure with vitality.

I may remark, as confirming all that has been said, what is our common experience and practice with regard to pleasure, namely, the greater value of the stimulants that are not intense, but voluminous, that affect moderately a large sensitive surface, or many nerves at once: the warm bath is a familiar instance; the music of a full band is another. The same happy effect springs from change or variety; the stimulation is multiplied, and no one part pushed to exhaustion.

The last point that I will advert to is the obscure subject of Narcotic

stimulants—alcohol, tea, tobacco, opium, and the rest. These operate a very little way, if at all, in giving new vitality; they draw upon our vitality, even till it is much below par, postponing the feeling of depression till another day. It is probable that the influence of the narcotics is complicated, and not the same for all. We may safely say respecting them, that they are the extreme instance of the principle of stimulation, as opposed to the principle of vital conservation; they are the large consumers, not the producers, of vitality; they expend our stock of power in nerve electricity in a higher degree, and with a more dangerous licence, than the ordinary stimulants of the senses.

The physical theory of Pleasure and Pain has a direct bearing in punishment and Prison Discipline. I happened to be present at a debate on that subject, in one of the sections of the British Association, at the Manchester meeting in 1861. The speakers were bent upon suggesting modes of punishment, painfully deterring, and yet not injurious to the convicts' health. I could not help remarking, from my conviction of the doctrine now expressed, that the object aimed at is all but a contradiction. There is, if any, the barest margin between the infliction of pain, and the destruction of vital power. If the first of the two maxims above stated (the connection of pleasure with vital conservation, &c.,) expresses the whole truth, there would be no margin at all; but it might seem that under the second maxim (Stimulation), there is room to operate as proposed. Stimulants cannot, as a general rule, be said to increase vital power; they are usually on the verge of destroying it, and frequently do destroy it. Consequently, the withholding of stimulation—in the shape of alcohol, tobacco, tea, cheerful light and spectacle, the sounds of busy life, society, amusing literature, &c.—cannot be said necessarily to abate the vital forces, and may be instrumental in conserving them. Nevertheless, if these are withheld to the extent of making them strongly craved for (and, if they are not, their loss does not punish), the state of craving is an internal conflict that lowers the general vitality. If the craving dies away after a time, the depression ceases, and so does the punishment. Then, again, it might seem that the application of what is painfully salubrious, would exactly hit the mark; as the cold bath, the well-ventilated and but moderately heated cell, cleanliness, measured food, steady industry, and regularity of life. But unless the convict takes kindly to these various measures, they are more depressing than wholesome; and if his system does adapt itself, that is, if they end in reforming his constitution and habits, they are no longer punishment. In the debate in question, one of the speakers, who I believe was officially connected with a London prison, remarked that, as a rule, discharged convicts are deteriorated in constitution. The opposite allegation has sometimes been made; but between the two I will venture to arbitrate by saying

that, in whatever cases the confinement operates as a serious punishment, the deterioration is almost certain. The same speaker observed that corporal punishment has this advantage over imprisonment,—that, while it is a severe deterring smart, it does not to the same degree inflict permanent damage.

Having now finished what I intended to say on the Feelings, the part next in order is the Will. But it is not my intention to make this the subject of a full discussion. Voluntary action is, in the face of it, a physical fact; animal muscle under nervous stimulation is one of the mechanical prime movers; the motive power of muscle is as purely physical as the motive power of steam; food is to the one what fuel is to the other. The distinguishing peculiarity of our voluntary movements is that they rise in Feeling and are guided by Intellect; hence so far as Will is concerned the problem of physical and mental concomitance is still a problem of Feeling or of Intellect. The extension and improvement of our voluntary power is one large department of our education; but the process of education is wholly included under the Intellect. I shall confine myself, then, as regards the Will to a short statement of the fundamental processes involved in it, one of which has just been before us under the Feelings, and will again appear as playing a part in the Intellect. In the Will altogether I reckon up *three* elements; two primitive, instinctive, or primordial, and a third a process of education or acquirement.

The first primordial element is called the Spontaneous Energy or Activity of the system, or the disposition of the moving organs to come into operation of themselves previous to, and apart from, the stimulation of the senses or the feelings; the activity being increased when such stimulation concurs with the primitive spontaneity. I think there is evidence to show that the profuse activity attendant on health, nourishment, youth, and a peculiar temperament called the active temperament, springs in a very great degree from inherent active power, with no purpose at first, but merely to expend itself; and that that activity gradually comes under the guidance of the feelings and purposes of the animal. It is the surplus nervous power of the system discharging itself without waiting for the promptings of sensation. In the course of our education the spontaneity is so linked with our feelings as to be an instrument of our well-being, in promoting our pleasures and removing pains. The voice by mere spontaneity sends forth sounds, the ear controls and directs them into melody, and the wants of the system generally make them useful in other ways.

2. Mere spontaneity, however, would not give us all that we find in the impulses of the Will. Being the overflow of vital power, it would show itself only whenever and wherever there was such an overflow. We want a kind of activity that shall start forth whenever

pleasure is to be secured or pain to be banished, and that shall be directed to the very points where these effects can be commanded.

For such a power we must refer to the great fundamental law of Pleasure and Pain—the law that connects Pleasure with increase of Vital Power, Pain with the diminution of Vital Power. This law we may look upon as in many respects the foundation, the mainstay, of our being ; it is the principle of self-conservation—the self-regulating, self-acting impulse of the animal system. When anyhow we come into a state of joyful elation, the physical state corresponding is an exaltation of vital energy to the muscles, the organic functions, one or other, or both ; and that exaltation is an increase of the activity that is bringing the pleasure. The first act of masticating a morsel of food develops a pleasurable feeling to the conscious mind, and a concurrent stimulus of heightened activity to the body ; the heightened activity vents itself in the parts actually moving at the time—the masticating organs, the cheeks, jaw, and tongue, which in consequence proceed with redoubled vigour, the pleasure thus feeding itself. In that connection we have, as I believe, the deepest foundation of the will. On the other hand, if, in the course of energetic movements of mastication, a false step occurs, the teeth embracing by mistake the skin of the lip, or the tongue, there is mentally a smart of pain, and physically, I think, a destruction of nervous power through the shock, and the destruction of power is at once and directly a cessation of the active currents impelling the mouth and the jaws.

Such I conceive to be the groundwork of Volition greatly, but never entirely, overlaid in mature life by a large superstructure of acquired connections between feelings and specific movements. Without some such foundation I see no way of beginning the work of voluntary acquisition, nothing to make our movements relevant to our state of feeling at the time ; moreover, it is the check that is always ready to step in and supersede our acquired habits. At any moment a burst of pleasure will raise our energies, a shock of pain (not being an acute existing smart) will depress them ; in the one case the cause of the pleasure, if our over activity, will be maintained with increase ; in the other case the energies are arrested, and if they are causing the pain, that will cease with them. The bursting out of a cheerful light in a dark labyrinth spurs us on without our going through the formality of what we call a resolution of the will ; a progress leading us to darkness, strangeness, and uncertainty will be arrested by the mere sinking away of our energies before even we can begin to deliberate. Our course in life from first to last, although most at first, is trial and error, groping and feeling our way, musing somehow and judging of the result ; and the general tendency of the law in question is to sustain us when we are in a good track, to turn off the steam when we are in a bad track.

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