

Illustrations of the Influence of the Mind upon the Body in Health and Disease, with especial reference to the Imagination. By DANIEL H. TUKE, M.D., M.R.C.P., late Visiting Medical Officer to the York Retreat.

(Concluded from vol. *viii.*, p. 197.)

INFLUENCE OF THE INTELLECT CONTINUED.

(III.) *The Intellect may excite ordinary sensations, may suspend them altogether (anæsthesia), or may induce excessive and morbid sensations (hyperæsthesia and dysæsthesia).*

The terse, but comprehensive expression of John Hunter contains in a nutshell the principle which underlies the greater part of the phenomena referred to in this section: "I am confident," he says, "that I can fix my attention to any part until I have a sensation in that part." Müller expresses the fact of the operation of the ideational upon the sensational centres in equally clear terms. "Ideas do not act merely on the motor apparatus by which they are expressed; they as frequently affect the organs of sense, which then present sensorial impressions or images of the ideas." Among other proofs, he gives the instance of a person's teeth being set on edge by witnessing another about to pass a sharp instrument over glass or porcelain; also the production of shuddering by the mentioning of objects which, if present, would excite that sensation; that is, by recollective Imagination. "I cannot think of seeing a slate rubbed with a dry sponge," remarks Herbert Spencer, "without there running through me the same thrill that actually seeing it produces."

If twenty persons direct their attention to their little fingers for five or ten minutes, the result will probably be something like this: A few will be unconscious of any sensation in this member; some will experience decided sensations—aching, pain, throbbing, &c.; and the majority will feel a slight sense of weight and tingling. This simple experiment raises several questions, as, Might sensations always be felt in the part, from the changes which are constantly going forward in the tissues, but are unobserved except when the attention is directed to them? Or, does the act of Attention excite increased vascularity of the sensory ganglia, and cause subjective sensations? Or, lastly, do the sympathetic centres

become excited, and the vaso-motor nerves influenced, so as to cause temporary vascular changes in the finger which involve sensation? The first supposition does not seem probable, except to a very slight extent. If correct, we should always feel some sensation in the finger when consciousness is directed towards it. We think both the remaining suppositions have weight. Probably the feeling experienced is partially subjective; but we believe there is a real effect produced upon the finger if Thought is sufficiently long directed to it, and that these vascular changes are felt in the form of throbbing, weight, &c. Others are more likely to be subjective.

Professor Gregory reports one of those frequent cases in which, by suggestion, "the subject" experiences a variety of sensations. "One arm was deprived of sensation, or both arms, or the whole frame. He was made to feel a knife burning hot, and the chair on which he sat equally so. When he started up he was made to feel the floor so hot that he was compelled to hop about, and wished to pull off his boots, which burnt him. He was made to feel the room intolerably warm, and actually perspired with the heat; after which he was made to feel it so cold, that in a minute or two he buttoned his coat, and walked about rubbing his hands. In about five minutes his hand was really chilled, as I found, like that of a person exposed to frost" ("Letters to a Candid Enquirer," p. 353).

Mr. Braid in investigating the alleged discoveries of Reichenbach in regard to the Od force, found that in nearly all cases, even when the person had not been hypnotised, drawing a magnet or other object slowly from the wrist to the point of the fingers produced various effects. Among these were "a change of temperature, tingling, creeping, pricking," while, when he reversed the motion, "it was generally followed by a change of symptoms, *from the altered current of ideas then suggested*. Moreover, if any idea of what might be expected existed in the mind previously, or was suggested orally during the process, it was generally very speedily realised. The above patients being now requested to look aside, or a screen having been interposed so as to prevent their seeing what was being done, if they were requested to describe their sensations during the repetition of the processes, similar phenomena were stated to be realised when there was nothing whatever done beyond watching them, and noting their responses." His son, Dr. Braid, who assisted his father in his experiments, remarks in a letter to myself a few years ago, "certainly the first

results would have misled anyone who was not accustomed to sift such matters."

Attention directed to the stomach notably causes a sensation of weight, aggravating or even originating dyspepsia. Discomfort, a sense of tension, and other forms of sensation may, everyone knows from experience, be induced in the several abdominal organs.

Probably no simpler example could be given of the morbid effect of Imagination on the body, in its recollective form, than the following common occurrence:—A child says, "thinking of that powder almost makes me sick." In fact he experiences nausea from no physical agent, but solely from the representative idea thereof in his mind. But for our familiarity with the fact, it would greatly surprise us that such should be the case.

Squeamishness is frequently caused by Attention and by other allied mental states. Marshall Hall mentions a person who could not attempt to untie a small knot without a sense of nausea.

We witness in the following instance the curious effect of what is usually called Association of Ideas:

Gratiolet relates of himself that when a child his sight became affected, and he was obliged to wear spectacles. The pressure which their weight exerted upon the nose was so insupportable that he was obliged to discontinue their use. Writing twenty years after, he says that he never sees anyone wearing spectacles, without instantly experiencing, very disagreeably; the sensation which had so much disturbed him as a boy.

When visiting the Crystal Palace some years ago it struck the writer that the man who then had charge of a galvanic battery could tell something about Imagination. I was not mistaken, for he assured me that very often when a lady had grasped the handles of the machine, she remarked on the peculiar sensations she experienced, and quite thought she was being galvanised, although he had not put the battery in action. But it is, in fact, perhaps equally deserving of notice, that such subjective impressions may, as in the present instance, have a limit to their operations, for the galvanist stated that he had never observed any twitching of the hands from these imaginary shocks.

Anæsthesia.—Insensibility to bodily pain, artificially induced, without drugs and solely by psychological means, is a most interesting and important fact, and would require a section

instead of a few paragraphs to do it justice. No one who has studied the history of anæsthetics * in all forms, doubts that, whether by inducing a profound and peculiar kind of sleep, or by merely rendering the patient insensible to sensorial impressions related to a certain idea or train of ideas, severe as well as trivial operations may be performed without any pain. †

In regard to the *special senses*, the influence of the mind is notorious. The state of the mind—the condition of the cerebral hemispheres—may play upon the ganglia of the senses so as to produce certain sensorial phenomena, and also may so affect the sensorium that impressions upon the senses received from the outer world may be modified in various ways. We cannot adopt Hunter's expression "the idea of a sensation is supposed to be the sensation itself," for there is a sensation, although subjective. When there is actual hallucination (amounting to insanity), we may say the idea of a sensation having induced such intensity of action of the sense ganglia, as to cause the same effect as if excited by a material object, is supposed to be a sensation caused by an objective impression.

There is a striking observation made by St. Theresa, whom M. Maury characterises as the metaphysician of feminine mysticism and of ecstatic illumination; namely, "I have known some of weak mind who imagine they *see* all that they *think*, and this," she adds, "is a very dangerous condition." One practical reflection may, in passing, be made upon the ecstasies to whom she refers. It would be much more difficult to believe in the credulity of the saints and mystics,

* It is a remarkable fact that in all, or nearly all histories of anæsthetics, *psychical* anæsthetics are not even mentioned. Yet they preceded drug-anæsthesia, and to a large extent suggested it. Cloquet removed a woman's breast, during the mesmeric sleep (she being able to converse, but insensible to pain), so far back as 1829. It is said that no fatal case from psychical anæsthesia has occurred.

† *Vide* Remarks by the writer on the occasion of Dr. Elliotson's death, in the "Medical Times and Gazette," August 29th, 1868. Since writing the above I observe the following in one of the public journals. I cannot vouch for its truth. "Dr. Gull, in 1847, questioned the desirability of removing pain. Bransby Cooper was 'averse to the prevention of suffering,' which, as he thought, led to 'reparatory action.' 'Pain,' argued Mr. Nunn, in one of the London medical organs, 'is compensated for by the effects produced on the system;' and a Dr. Pickford wrote that 'pain during operations was beneficial;' while Majendie—he who said to the writhing dog, 'Taisez-vous, mon petit!'—declared in the French Academy that 'it was trivial to suffer, and that an invention to annul pain under the knife was only of mediocre interest to surgery.'" From this point of view, freedom from pain in a future world would be rather a disadvantage than otherwise.

if we did not see ample physiological reasons for believing that the senses were really acted upon by their intense thought on certain spiritual subjects. They knew nothing of the action of Expectation or Imagination upon the sensorium. We know to what source Luther referred his visions, even when they were such as we might have supposed he would welcome. In the following instance, one cannot attribute the influence of the brain to either of the above-mentioned states of mind, and it is, therefore, a specially interesting example of automatic cerebral action, excited by an idea vividly present in the mind. "On Good Friday last," he says, "I being in my chamber in fervent prayer, contemplating with myself how Christ, my Saviour, on the cross suffered and died for our sins, there suddenly appeared upon the wall a bright vision of our Saviour Christ with the five wounds, steadfastly looking upon me, as if it had been Christ himself corporeally. At first sight, I thought it had been some celestial revelation, but I reflected that it must needs be an illusion and juggling of the devil, for Christ appeared to us in His word, and in a meaner and more humble form, therefore I spake to the vision thus:—Avoid thee! I know no other Christ than He who was crucified, and who in His word is pictured and presented unto me. Whereupon the image vanished, clearly showing of whom it came." ("Table Talk," p. 104.)

Now in such a case as this, while we do not think it necessary to assume more than an excitement of the sensory ganglia, Müller would have held that there was an image impressed on the retina excited by internal, instead of, as normally happens, by external stimuli. In his section on the "Influence of the Mind upon the Senses," he objects to the term hallucination being applied to such experiences, because it implies that the phantasm is a mere idea, instead of being truly a sensation. This objection is, of course, equally forcible, whether we regard the retina (in the case of vision) or the central ganglia, as the seat of the phenomenon.

Müller's remark, when referring to those cases in which extirpation of the eye co-exists with phantasms, that they "prove that the presence of the retina is not a necessary condition for the production of such phenomena, but, on the contrary, that the deeper seated parts of the essential organ of vision are alone required" is an admission sufficient to allow of all other instances of spectral phenomena from subjective causes being referred to the sensory ganglia and

central nuclei of the optic nerve. Luther's mode of accounting for the vanishing of the apparition is an amusing contrast to the description given by Müller of phantasmata witnessed by himself on waking. "I have myself," he says, "very frequently seen these phantasms, but am now less liable to them than formerly. It has become my custom, when I perceive such images, immediately to open my eyes and direct them upon the wall or surrounding bodies. The images are then visible, *but quickly fade.*" So prosaic a narrative of events would have hardly suited the fervent imagination of the great Reformer.

Unusually vivid sensations from external objects occasioned by cerebral excitement at the time will, as we have frequent proofs, remain, or be easily recalled, long after the original impression was received. This was strikingly shown in the experience of one of the survivors of the unfortunate "London." When escaping from the wreck, in the boat, he would sometimes be baling out the water and half asleep at the time. When in this state he could often see a vessel before him with her stern under water, her jibboom and foretopmast gone, and her foresail shaking in the wind. "It was the 'London' as she last appeared to me. At any time during the night if I were to close my eyes, if only for a second, the ship was always before me *in this form.*" And after being picked up by the barque next day, and able to have some sleep, he says, "and a troubled sleep it was. I passed through all the horrors of another shipwreck; and for many nights after, and I may say many weeks after, I had to go through the same ordeal." The phenomena are of a mixed character in these cases. The mental condition, no doubt, originally determined the intensity of the sensations which led to the subsequent spectral ship; but in his sleep, the writer's sensory ganglia excited the activity of the cerebral hemispheres; sensation excited a corresponding train of ideas.

The simplest example, perhaps, which can be adduced of the influence of Attention upon the sensory ganglia, is the act of recalling a visual impression, even after a long interval of time. Thus, Sir Isaac Newton, in a letter to Locke, describes how he once looked a short time at the sun in a mirror, and then turned his eyes into a dark corner of his room till the spectrum vanished, repeating the experiment three times. The third time he found to his amazement, when the light and colours were almost gone, that they began to return "by intending his fancy upon them," and became as vivid as when

he had just looked at the sun, but if he ceased to intend his fancy upon them, they vanished again. "After this," he says, "I found that as often as I went into the dark and intended my mind upon them, as when a man looks earnestly to see anything which is difficult to be seen, I could make the phantasm return without looking any more upon the sun, and the oftener I made it return, the more easily I could make it return again." At last he brought his eyes "to such a pass" that he had to shut himself up in a dark room for three days together "to divert my Imagination from the sun; for if I thought upon him, I presently saw his picture, though I was in the dark." By this method, and employing his mind about other things, he began in a few days to have some use of his eyes again. Yet for some months after, "the spectrum of the sun began to return as often as I began to meditate upon the phenomena, even though I lay in bed at midnight, with my curtains drawn." When Newton wrote this interesting account to Locke, he said he had been several years very well, but he thought that he could recall the spectrum "by the power of his Fancy," if he durst try. He adds, that such a recurrence involves a question "about the power of Fancy," which he confesses is "too hard a knot for me to untie," but inclines to refer it to "a disposition of the sensorium to move the Imagination strongly, and to be easily moved, both by the Imagination and by the light, as often as bright objects were looked upon." Another remarkable observation was made by Newton in this case. He had only looked at the sun (in the mirror) with his right eye, yet he found that "my Fancy began to make an impression on my left eye as well as upon my right," and he could see the spectrum of the sun if he did but intend his Fancy a little while upon it. So that here the powerful direction of Thought or Attention produced the same effect on the left eye, or a point in the optic ganglia corresponding thereto, as that of the sun itself upon the right eye.

A man has his mind so far awake during sleep as to dream of a figure; either one which has formerly impressed his retina and sensorium, or which he never saw, and is the product of his Imagination. That his sensory ganglia at least have been in activity, as well as his cerebral lobes, is indicated by the occasional persistence of the phantom after awaking from the sleep in which the dream has occurred. Müller referred to this fact to prove that the retina is acted upon by the activity of the brain or mind in sleep, but we

need not go further than the sensorium. The idea has been transmitted there—an ideo-sensory action.

The next case, given by Brodie, illustrates these remarks. He gives it as a proof that in visions connected with our dreams, there is something more than what occurs in the instance of objects ordinarily presented to our minds by Memory and Imagination. What this “more” consists of is not decided by Brodie, and its decision must depend upon whether we hold that in the operation of these faculties the same brain-tracks (sensory ganglia) are excited as in the production of actual phantoms, the only difference being one of intensity; or, that the cerebral hemispheres only are in operation. “A friend of mine on awaking in the morning, saw standing at the foot of his bed a figure in a sort of Persian dress. It was as plainly to be seen, and as distinct, as the chairs and tables in the room, so that my friend was on the point of going up to it, that he might ascertain what, or rather who, it was. Looking, however, steadfastly at it, he observed that, although the figure was as plain as possible, the door behind it was plainly to be seen also, and presently the figure disappeared. Considering the matter afterwards, he recollected that he had had a dream, in which the Persian figure played a conspicuous part; and thus the whole was satisfactorily explained, it being evident that the dream, as far as this part of it was concerned, had continued after he was awake, and so that the perception of the imaginary object had existed simultaneously with that of the real ones.”

Anæsthesia of the special senses in regard to all impressions from without, except those with which a person from some particular cause is in relation, is strikingly exhibited in “biological” or hypnotic states. Thus a subject may be deaf to all sounds except the voice of the operator. Sir James Simpson pointed out this fact, years ago, at a meeting of the Edinburgh Medico-Chirurgical Society. He observed that such persons “were deaf for the time to other sounds. Bells may be rung in their ears, strong noises of all kinds made, tickling, shaking, rubbing the cornea, &c., practised, but they sleep on, apparently listening alone to the voice that sent them asleep to summon them again to the wakening state.”

It may be that in such cases it can hardly be said that the cerebral hemispheres act upon the sensory ganglia so as to produce this effect, and that it is rather that the impressions which reach the sensorium are not perceived by the mind, unless they be directly related to the idea or ideas which are

at that time dominant. Still, the state of the Intellect determines the effect of the sensorial impression. This condition is exemplified also in cases of ordinary sleep, absence of mind or abstraction, day dreaming or reverie, as well as in the somnambulistic states just referred to.

In the case of Sir Edward Codrington, given by Carpenter ("Human Physiology," p. 855), both the cerebral hemispheres and the sensory ganglia must have been in a state of profound repose, but there existed an impressibility as regards a particular idea ("signal"), and this idea aroused the influence which, according to Mr. Moore, controls the sympathetic ganglia, and through which the vessels of the brain fill again. Dr. Carpenter expresses it thus: "The awakening power of sensory impression is greatly modified by our habitual state of mind in regard to them. Thus, if we are accustomed to attend to these impressions, and our perception of them is thus increased in acuteness, we are much more easily aroused by them than we are by others which are in themselves much stronger, but which we have been accustomed to disregard."

A curious illustration of the influence of the Imagination in modifying the perceptions of sensorial impressions derived from the outer world, occurred during the conflagration at the Crystal Palace in the winter of 1866-7. When the animals were destroyed by fire it was supposed that the chimpanzee had succeeded in escaping from his cage. Attracted to the roof, with this expectation in full force, men saw the unhappy animal holding on to it, and writhing in agony to get astride one of the iron ribs. It need not be said that its struggles were watched by those below with breathless suspense, and, as the newspapers informed us, "with sickening dread." But there was no animal whatever there, and all this feeling was thrown away upon a tattered piece of blind so torn as to resemble, to the eye of fancy, the body, arms, and legs of an ape!

In the following case within my own knowledge the visual illusion was clearly excited by the idea being, in the first instance, present to the mind. A lady was walking one day from Penryn to Falmouth, and her mind being at that time, or recently, occupied by the subject of drinking fountains, thought she saw in the road a newly erected fountain, and even distinguished an inscription upon it namely—

"If any man thirst, let him come unto me and drink."

Some time afterwards she mentioned the fact with pleasure to the daughters of a gentleman who was supposed to have erected it. They expressed their surprise at her statement, and assured her she must be quite mistaken. Perplexed with the contradiction between the testimony of her senses and of those who would have been aware of the fact had it been true, and feeling that she could not have been deceived (for "seeing is believing"), she repaired to the spot and found to her astonishment that no drinking fountain was in existence—only a few scattered stones, which had formed the foundation upon which the suggestion of an expectant Imagination had built the superstructure. The subject having previously occupied her attention, these sufficed to form, not only a definite erection, but one inscribed by an appropriate motto corresponding to the leading idea.

In our ordinary language, we give the senses a worse character than they deserve. They report correctly on various occasions, but we draw an incorrect inference or read their reports in a hasty or slovenly manner. It is only when the sensory apparatus is diseased in the first instance that we can properly speak of the senses deceiving us. The common reply to this apology for our senses is that in many instances, as in that of the oar which, although entire, looks broken in the water, our senses even in a healthy condition mislead us. A little consideration, however, will show that our senses are not really at fault even in this instance, and that if we arrive at a false conclusion, it is the result of our not making allowance for an intervening medium between the eye and the oar. Who would blame the eye because it could not have seen the oar at all, had there been a stone wall in the way? As unfair would it be to charge the eye with deception because its function is interfered with and distorted by an intervenient fluid. The child believes the oar broken because he has not yet learned the effect produced by the refracting power of water. Ignorance is the cause of an erroneous belief; the water the cause of the appearance of the oar; the organ of sight must be acquitted of all blame.

As regards the sense of hearing, it is very manifest that the thought uppermost in the mind—the predominant idea or expectation—makes a real sensation from without assume a different character. If of two children listening to a peal of bells one is told that they say "Long live the King," and the other, "Never, for ever," to each the chime may sound as he expects to hear it. But, of course, those instances are much

more striking in which the expectation excites the central termination of the auditory nerve, so that sounds, voices, &c., are actually heard. The Imagination may be justly said to be the cause, but it is no Imagination that sounds are heard. The fine passage of Madame de Stael, "So mighty sometimes is the power of Imagination that by it we hear in our hearts the very voice and accents of one whom we love," is true in a more literal sense than probably she intended.

The influence of Attention in intensifying auditory sensations is constantly brought under our notice. The Highland woman hearing the distant pibroch when Havelock was approaching to the relief of Lucknow is a beautiful illustration of the familiar fact that the intense direction of the thoughts to a particular sensation increases the sensitiveness of the sensorium.

So with the sense of taste.

With imaginative people, the food eaten or the fluid drunk assumes a very different taste according to the fancy. Misled by Expectation, the grumbler finds the meat taste bad, the water abominable. I have known a gentleman, hopelessly fanciful, send out the cream from table because it tasted sour, and find it sweet when the servant brought in what was supposed to be, but was not, a fresh supply.

In concluding this Section, I wish to revert to the states of mind in Recollection and Imagination in connection with the vexed question of the character and seat of resuscitated mental images.

It is disputed, as regards the ordinary memory of an object or the creations of the Imagination—re-presentative consciousness—whether the same psychical or encephalic condition is excited as in the actual perception of an object present to the senses—presentative states of the Mind. It is obvious that the answer to this question is of great interest in the consideration of the influence of ideal psychical states upon the body, whether intellectual or emotional. The teachings of psychologists of the present day appear decidedly to favour an affirmative reply.

Abercrombie's work on the "Intellectual Powers" elicited a remarkable review in the "Quarterly" for July, 1831, from the pen of Sir David Brewster, who combated the idea that in Memory and Imagination the mind recalls past impressions and forms fresh combinations, "without any assistance from the organs of perception," and maintained that while in the ordinary action of these faculties, owing to the exceedingly

fleeting character of the mental images produced, and the counteracting influence of the external world, we cannot fix and subject them to examination, there are exceptionally favouring circumstances which render it possible to examine them as carefully as impressions made upon the retina by luminous bodies, and that in these cases the images recalled by Memory, or created by Imagination, "follow the motions of the head and eye." This he explained by supposing that the recollection of an object previously seen, acts by retransmission from the brain along the nerves to the same points of the retina as had been acted upon by the original object, when the impression there had been transmitted to the sensorium. A very faint and transient impression was supposed by him to be formed on the retina, just sufficient for the purposes of memory and imagination. If, moreover, these faculties are powerful, and the nerves excitable, the retinal impression becomes so distinct as to constitute a spectral illusion. Brewster's general conclusion was this, that "in all our organs of sense the mind possesses the power of retransmitting through the nervous filaments to the expansion of the nerves which are acted upon by external objects, impressions which these nerves have previously transmitted to the brain," feeble in ordinary Memory and Imaginary, brilliant and phantasmatic in abnormal states of the brain or nerves. If for the peripheral expansion of the sensory nerves we substitute the sensorium, or whatever that portion of the brain may be in which impressions are registered, Brewster's opinion is in accordance with that to which we have just referred. His proofs are not altogether satisfactory, for, in the first place, the examples he adduces are not those of ordinary Memory or Imagination; and, secondly, as regards actual phantasms, the fact that they move with the eye may be explained on another principle than that of referring the revived impression to the external organs themselves.

At first sight, simply to think of and recall the face of an absent friend, and so to think of him as to see his face projected as if present before me, do certainly seem very distinct psychical, and therefore encephalic, conditions, not only in degree or intensity, but in kind and seat. The one operation feels to be so purely "mental," the other so sensorial. That subjective sensations and objective sensations occupy the same seat cannot be doubted; but the difficult question is, whether the definite remembrance of a particular object passing beyond a mere notion does, or does not, cause a true

sensation, however faint. It is easy to believe that the seat of a spectral form of a mountain is identical with that of the conscious impression of the actual object when present to the senses, but not so easy to believe that in recollecting a certain mountain, and tracing its outline, or imagining one, "we are repeating the same currents and reanimating the same nervous tracks as in the survey of the actual mountain" (Bain). In opposition to this hypothesis it is urged* that perception is a *bi-une* fact, or a synthesis of cognition and object, while Memory and Imagination are not so, for the object is not present to them. It is denied that seeing a rose and the remembered outline of a rose involve the same operation of mind—the only difference being, as alleged, one of intensity. Dr. Carpenter, on the other hand, speaks of "ideas or conceptions as cerebral (*i. e.* hemispherical) states, which seems to recall the same condition of the sensorium as that which was originally excited by the sensory impression" (Human Physiology, p. 749). It is true, I can think of a rose, have a bare abstract notion of it, without any action of the sensorium, but it may nevertheless be true that the moment it is figured in the mind's eye, although no spectrum or phantasm is formed, there occurs a change in the optic nerve-centre—the *corpora quadrigemina*. Still, we think, it is practically difficult to decide at what point the strictly ideational passes into the sensational.

Mr. G. H. Lewes, in an article in the "Fortnightly Review" (February, 1872) on "Charles Dickens," states an interesting fact in reference to his brain-fictions, namely (what the novelist had himself told him), that "every word said by his characters was distinctly *heard* by him. I was at first," he adds, "not a little puzzled to account for the fact that he could hear language so utterly unlike the language of real feeling, and not be aware of its preposterousness; but the surprise vanished when I thought of the phenomena of hallucination." Such instances may be thought to support the above view, that the creations of the Imagination, and the images recalled by the Memory occupy the same nervous tract as those which are excited by impressions from without, and that they only require additional intensity to become what are admitted by all to be (subjective) sensations possessing the distinctness which ordinarily characterises those of objec-

* See this position ably maintained by Rev. W. G. Davies in this Journal for April, 1864. See also the observations of Dr. L. Clarke in the "Psychological Journal," January, 1863, p. 19.

tive origin. At any rate, they show how great a tendency mere thought has to excite or awaken the correlated sensation. Dickens also says, in regard to his sister-in-law Mary, that after her death he was haunted by her image every day, and dreamt that he saw her every night for a year. He does not mean, we suppose, that he saw a spectral form in the day—merely a vividly defined and irrepressible memory of her person. In the dream, when the outer world was excluded, the very same image presented all the characters of a sensorial impression.

Just, then, as in perceiving objects around us, subject-consciousness and object-consciousness are united, sensorial perception passing insensibly into intellectual perception; so in Recollection and Imagination, the ideational and sensational changes are almost inseparable; the calling up of the one state as originally excited by external objects, calls up the other; and in this way the old paths are traversed, though in a reverse order. It may, however, be admitted, we think, that the original idea which was abstracted from the sensorial perception *can* arise in the mind, or be recalled as a general notion, without the action of the sensory centres being excited.

The application of this position to the influence of ideal states of mind is obvious; whether they excite by their intensity and vividness general bodily sensations, or such action of the sensorial centres that the mind refers the special sensations to objective sources of excitement; whether they cause movements, or whether they act upon the organic functions. Whatever hypothesis we adopt, the fundamental fact remains, that Sensation and Motion are not merely more readily reproduced by the original impressions being repeated, but may be reproduced without our having the slightest recourse to the original, so that we may breathe an atmosphere in which the body feels, the eye sees, the ear hears, the nose smells, and the palate tastes, as acutely as if the material world excited these sensations, and may perform muscular actions without, and even against, the Will, and with or without consciousness, solely in response to ideas, whether recalled by the Memory or created by the Imagination. There may be here two distinct series of automatic phenomena—the involuntary representation of single or combined presentations, and the involuntary results in Sense and Motion—ideo-sensory and ideo-motor; the common centre acted upon by objective impressions from without and by subjective impres-

sions from within, being the sensorium, and the resulting sensations and motions being in many instances as powerful from the latter (the inner) source as from the former, and in some instances more so.

The following are the most important conclusions in connection with the Influence of the Intellect on Sensation :—

1. When ideas arise from the sensorial perception of impressions upon the peripheral terminations of the various classes of nerves, they may react upon the sensory ganglia, and influence general, special, organic, and muscular sensations, causing sensational illusions.

2. When, through intellectual operations, ideas are imagined or recalled, these may be merely ideational states, but they ever tend to become identical in character, though not necessarily in degree, with the complex states formed when peripheral impressions from external objects first excited them. The recurrence therefore of the ideational state co-operating with the sensory ganglia, usually recalls also, although but faintly, the sensation corresponding to the idea.

3. In some conditions of the encephalic centres, such a powerful excitement of the sensory ganglia occurs, that the effect is identical in sensory force—in objectivity—with that which results from an impression produced upon the peripheral termination of the nerves, causing hallucinations or phantasms.

4. The mind under certain circumstances can, by Attention, recall the sensorial impression so distinctly as to produce, *e.g.*, in the case of sight, the spectrum or image which was impressed on the retina and perceived by the sensorium.

5. Not only may hyperæsthesia of one or more of the senses be produced, but complete anæsthesia be caused by psychical means; encephalic vascularity and innervation being increased or lessened in the several sense-centres.

(IV.) *The Intellect may powerfully excite, modify, or suspend the Organic Functions, causing changes in nutrition, secretion, and excretion, and thereby affecting the development and maintenance of the body.*

The consideration we have given to the influence of Thought or Intellect, in its various aspects, upon the muscles engaged in the vascular and respiratory systems, has, at the same time, exhibited to a great extent its action upon the functions of organic life. The part played by the involuntary muscles in the processes of secretion and nutrition is so important that the two cannot properly be separated, and the present is in fact a continuation and supplement of the section in which this was considered.

As mental activity affects the respiration, and the circulation and aerification of the blood, its influence on secretion and nutrition might be predicated even without proceeding more deeply into the causes of this influence.

Illustrations of the influence upon Secretion, of ideas—the representative states of consciousness which Imagination, both in its recollective and constructive or creative form, comprises—will readily occur to the reader. Unzer expresses the truth very clearly. “Many glands pour out their secretions from Imaginations.” The mental image or idea must, of course, be in relation to the secreting organ.

The salivary glands are so notably affected by ideas that they are frequently referred to. We know that the mere idea of food is sufficient to excite the function of these glands. To procure sufficient saliva for his experiments, Eberle vividly imagined acid fruits. If a teaspoonful of coloured water be placed in the mouth under the impression that it is tincture of pellitory, the amount of saliva will be considerably increased. In the hypnotic state this would be still more effective. Just as spasms or convulsions are more likely to happen when the will is suspended and the cord acts independently, so when the controlling power is removed from the brain, its automatic action is intensified, and ideas exert much more power over the organic functions when directed towards them. There is a constant antagonism between voluntary and involuntary actions, and when anything occurs to neutralise the former, the latter rules the hour. One reason why the Emotions act so much more powerfully upon these functions is, because they are less under the control of volition than the intellectual faculties are, besides being probably in much closer anatomical relation with the nervous centres which influence the vascularity of the secreting glands.

The influence of Attention on the mammary glands is well recognised. The case of a lady is recorded by Dr. Parry, who, after the period of nursing, was accustomed to have milk secreted whenever she heard a child cry. Reflex action of the encephalic centres specially related to the organic functions is here well illustrated.

As regards the secretion of the liver, we may refer here to what is called a “bilious headache” when brought on by over-work at the desk. Anyone given to study can trace such an attack from its earliest stage. Dr. Latham, of Cambridge, in a Clinical Lecture on Nervous or Sick Headaches (*Brit. Med. Journal*, 1872), states that he meets with a great many

cases (sufficiently severe to require treatment) both in males and females, but "perhaps in an University town, owing to the large proportion of individuals of studious and sedentary habits, it may be more prevalent among males than in other places." The attacks he refers to were brought on by "prolonged mental work, protracted mental excitement, or any intense strain on the feelings." That the attack may come on during actual work, and be arrested by suspending mental application, we have ample evidence to prove. It is, however, true that, if there is actual mental excitement, "the attack may not be developed during the paroxysm, but afterwards, when the excitement has passed off, and the mental strain is somewhat lessened." He marks two stages—one of disordered sensation, including glimmering, spectral forms, and other signs of visual derangement, tingling in some portion of the body, as the arm or one side of the tongue, affections of hearing and (involving the motor centres) speech, and loss of power over the facial muscles; the other of headache and nausea, which so often occur with the sensorial disturbances, the chief symptoms being cold feet, restlessness, and the localised, more or less piercing pain felt in the head, especially (so far as our observation goes) over the left eyebrow. Dr. Latham's cases were generally marked by anæmia, a relaxed condition of the muscles and arteries; the pulse small and compressible, often slow, but accelerated on slight exertion; the general tone of the system, in short, being lowered. The headache he considers explained by the contraction of the cerebral vessels in the first instance being followed by their dilatation; the vaso-motor nerves of the sympathetic being first excited, and then exhausted.

The secretion of gastric juice is, in all probability, increased by the idea of eating. It would be difficult, however, actually to prove it.

In like manner, thought acts upon the secretory functions of the skin, kidneys, and the intestinal glands. Hence ideal diaphoretics, diuretics, and purgatives, exclusive of those which excite the peristaltic action of the intestines.

The influence of intense study, long continued, in causing diabetes will not be questioned. In one of the most rapid cases which have fallen under our notice, this was apparently the cause. Dr. Richardson refers in this journal (1868) to three cases "in which the first excretion of sugar and the profuse diuresis were sequential to severe mental strain," and

observes that "they constitute a hopeless class; the danger sudden, the course rapid, the fatal end sure."

In the "Medical Times and Gazette," Oct. 10th, 1868, are given the results of an examination by Dr. Byasson of the renal secretion passed under the opposite conditions of repose and cerebral activity. They may be thus summarised:—

1st. The exercise of thought was followed by an increase in the amount of urine. The number 1157 represented the quantity in cubic centimètres on the days of repose; 1320 on those of cerebral activity.

2nd. The amount of urea was augmented in a marked manner (indicating increased disintegration), there being about a drachm more on the day of cerebral work than on that of repose. Dr. Byasson does not doubt the contrast would be greater if complete repose had been secured. "The experiments were so arranged that a day devoted to brain-work sometimes succeeded a day of repose and sometimes a day of muscular work, and in each case there was a perfect concordance in the results."

3rd. A slight but uniform increase in the amount of the phosphates and sulphates. Anhydrous phosphoric acid is represented on the day of repose by 1.51, and on the day of active thought by 1.98.

4th. The density, the acidity, the uric acid, lime, magnesia, and potash, were scarcely affected. Chlorine was less in amount.

Dr. Byasson says that he can tell by a single analysis of the urine whether a man has passed the day in repose, or active thought, or muscular exertion, supposing the diet to have been uniform and the external conditions similar during three days so employed.

Passing on to Nutrition, a few observations may be made upon the unquestionable influence excited by intellectual states. As nutrition only occurs when the vital force is more powerful than the opposing chemical forces, whatever in mental action lowers vitality, will proportionately interfere with nutritive processes.

Intense mental application may be said to interfere with nutrition in one form or other. In determining, however, the general ill-effect of study upon the body, it is impossible accurately to disentangle its influence from that of loss of exercise, fresh air, &c. But that it interferes with nutrition in many instances cannot be doubted; sufficiently so to justify the oft-quoted line from Shakespeare respecting Cassius's

lean and hungry look, "He thinks too much." Still it is rather the plotting thought—the studying the overthrow of inconvenient rivals—that is here referred to, which wears away the flesh, and which justifies the expression that "such men are dangerous." On the other hand, the removal of the means of study when the intellectual pursuits have become a habit, is detrimental to health.

Descuret devotes a chapter to the "Mania of Study," and cites Rousseau's exaggerated expression "The man who thinks is a depraved animal," which he paraphrases "The man who thinks too much depraves his constitution," and enumerates among the consequences of extreme mental exertion, gastritis, enteritis, hæmorrhoids, cancer of the stomach or intestines, and chronic affections of the urinary organs.

Whatever may be the injurious influence of mental work, the age to which many eminent thinkers have attained shows, at least, that it is not inconsistent with longevity, although from disuse the muscular system may become wasted.

In some of the cases usually given, however, it must be remembered that, though life was prolonged, the organ of mind itself was completely worn out.

"With curious art, the brain, too finely wrought,
Preys on itself, and is destroyed by thought."

Madden, in his "Infirmities of Genius" (quoted by Dr. Sweetser), has endeavoured to estimate the relative longevity of different classes of authors. The natural philosophers in his table are at the top, their age averaging 75. The poets are at the bottom, who average 57. Caspar gives the average age of clergymen at 65; merchants, 62; clerks, farmers, 61 each; military men, 59; lawyers, 58; artists, 57; medical men, 56. It is obvious that the element of which we are in search is only one of many in these various occupations. It might be expected that, as appears above, medical men would be shorter lived than clergymen, without reference to mere brain work; taking the deaths, however, of twenty-two distinguished members of the former profession in England in 1870, their ages ranged between 75 and 76. As to the natural philosophers (mainly mathematicians) and poets, whether or not statistics comprise a sufficient number of cases, it is highly probable that the greater longevity of the former is a fact. If Wordsworth is a marked exception, he is also exceptional in the character of his poetry. He was more philosophical than emotional. Everything goes to

prove that purely intellectual pursuits influence the organic functions much less powerfully than pursuits involving the passions. It shows the necessity of distinguishing between different forms of mental manifestation; the much closer connection which some mental processes have with the bodily organs than others; the far greater tendency some have to interrupt and suspend their operation than others. Thus, it is obvious that Sir Isaac Newton's intense concentration of thought did not imperil the action of the heart, while John Hunter's intense indignation suspended its action. All forms of disease are indiscriminately laid at the door of study by Tissot—namely, gout, tumours, aneurisms, inflammations, scirrhoties, ulcers, dropsies, baldness, apoplexies, convulsions, &c.; but it would be altogether opposed to medical experience to assert that the chances of inflammation or aneurism, and apoplexy or convulsions arising from study, are equal. An aortic aneurism or a dropsy is much more likely to result from passion or other sudden emotional action than from thought.

Under this division reference should be made to the influence which we cannot doubt that mental states may, under favourable circumstances, exercise upon absorption. Professor Laycock has maintained "the possibility of a lymph deposit being absorbed from an opaque cornea by the daily direction of the Attention to the part for a prolonged period by means of mesmeric passes" ("Brit. and For. Med. Rev.," Oct., 1851). If this be so, we have a fact, the principle contained in which forms a most important basis for the practical treatment of some diseases. It is in entire accordance with the physiological law laid down by Müller: "An idea that a structural defect will certainly be removed by a certain act increases the organic action of the part" ("Physiology," p. 1396).

In concluding the consideration of the Influence of the Intellect upon the Body, it is important to have clearly in view:—

1. Intellectual States, the result of impressions made upon the senses from without, or consisting of purely ideal states, whether these be formed by recollective or creative Imagination (the simple remembrance of sensations excited by the outer world, or so combined as to construct new forms), cause Sensation, Motion, and important changes in the Organic Functions of the body.

2. These ideal states may be as vivid and operative as if actually induced by real objects acting directly upon the sensory nerves.

3. In the ideal states, the bodily changes correspond to the ideas present in the mind, and are themselves involuntary; illustrating the automatic action of the hemispheres upon the sensory, motor, and sympathetic centres.

4. The Muscular movements which express mental states (gesture language), correspond in great measure to those movements which arise from impressions from external stimuli on the peripheral expansion of sensory nerves. They are figurative, and hence verbal expressions also are applied in common to both; in the one case intended to be literal, in the other metaphoric. This analogous language, thus applied to ideal and actual states, may either be explained on the principle that the encephalic seats of both are identical, or that ideational changes always tend to pass downwards to the motor and sensory centres.

5. In both mental states—the ideal and that excited by sensible objects—the Sensorium may be placed in exactly the same condition, both as to kind and degree of change, the stimulus proceeding from within, in the one case, and from without in the other; the mind in the former instance always referring the sensation to the peripheral end of the nerves.

We now conclude the series of papers having for their object the illustration (by cases) of the Influence of the Mind upon the Body, more especially with the view of showing thereby how great is the influence of what is usually called the Imagination, directly and indirectly, upon our sensations, movements, and organic functions. The practical inference seems obvious—apart from teaching us to avoid its maleficent effects—that if such important changes can be induced in health, the same agency rightly directed might and ought to be beneficially employed in disease. Of the Influence of the Mind upon the Body in disease, we speak in detail in a work just published, containing the articles which have appeared in this journal, with a large amount of additional matter.