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PART 1.—ORIGINAL ARTICLES.

Reflex, Automatic, and Unconscious Cerebration: A History and a Criticism.

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(*Continued from Vol.* xxi., *p.* 498).

VIII.—Turning from the living mechanism and its energies, to the energies derived from without that move it—the "strings of the puppet"—to use the mechanical phraseology, we come upon another class of words and phrases which are ambiguously used in the "old metaphysics," but which have a definite and wholly different meaning in studying the organic bases of mental life. These are such words as *impression*, *irritation*, *suggestion*, and the like. I may be permitted to state, somewhat dogmatically, what is now admitted generally, that all changes in the constituent matter of living things result from the operation of physical or molecular energies therein. This being so, the cerebral series of changes involved in mental states of the individual, and constituting the process termed cerebral reflex action, are due to as purely physical causes as those on which spinal reflex action depends. And this is true, not less as regards feelings like corporeal pain, and sensations, than as regards the highest work of the intellectual faculties. This operation of physical energies, however, was not recognised by Marshall Hall and Dr. Carpenter in 1838, nor, indeed, by physiologists in general. One source of the difficulty experienced in doing this is in the imperfect appreciation of what is physically included under the word *impression*. Thus, an anonymous defender of the views of the eminent physiologists named observes, in 1846, in opposition to my views—

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"Dr. Laycock mentions that the sight and hearing of certain things excite reflex actions of the brain. Will he maintain the absurdity that in hydrophobia the impinging of the sound upon the auditory nerves produced in the utterance of the word 'water' makes an impression different from the sound of any other word, and which is carried by an incident and reflex action to the vocal organ?" ("*Vindex*" in Lancet, 2nd May, 1846.)

The answer to this objection is simple. In cerebral reflex action, as in the "true spinal" kind, it is only certain kinds of excito-motor or excito-sensory impressions, and these acting on certain kinds of nerves going to certain centres, that can excite cerebral reflex actions and conscious states, whether they be instinctive, sensational, emotional, or volitional. Hence, I have named this class *affinitive impressions*. Words and like signs of ideas, whether of writing or of speech, are the result of the consensual actions of certain muscles, and, as such, are in excito-motor and excito-sensory affinity with the respective substrata upon which they depend; and so they not only make manifest the corresponding states of consciousness of the individual, but are affinitive excitors of corresponding states in others. It is thus that the signs of emotions in an individual are the excitors of emotions in others. Upon this law the arts of the orator and actor are founded. According to this, also, sympathies and antipathies are excited, even by a tone of voice or a glance; and to carry the analogy into the highest development of the human mind, it is by the same law that speech and writing, the affinitive signs of conscious states, as knowledge, act upon the hemispheres and excite therein the organic conditions of those conscious states as knowledge. Dr. Carpenter has himself witnessed how the notion of personal identity of persons in mesmeric sleep can be at once changed by spoken words to that effect. But this, according to the well-known law of pathology, is only an "abnormal" manifestation of the "normal," for in all the business of life mankind are thus subject to the influence of words and phrases in exciting thought and volition.

This affinity of impressions with their corresponding *locus in quo* of reception suggests the analogy of chemical affinity; but the reader to whom the *physics* of impressions are wholly new, will be better able to understand them if he will apply the principles of optics and acoustics to the solution of the problems, and bear in mind what wonderful mechanical adjustments of the optic and auditory apparatus are needed, to constitute the vibrations of sound and the undulations of

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light into auditory and visual impressions. On this point the researches of Helmholtz are very instructive. It has recently been shown by calculation that, in hearing, the adjustments, by means of the muscles and the bones of the ear, are so minute as to be invisible to the highest microscopic powers. Then he has to consider how minute impressions, such as a glance of the eye in fencing, or in discourse, will excite an instantaneous thought or volition in adaptation to an end.

It is, therefore, to the reflex action of the cerebrum, thus excited through the recipient organs of those affinitive impressions which are the signs of feeling and thought, that the processes termed *suggestion* and *direction* of *attention* are due, whether they arise in ordinary life, or during mesmeric manipulations. Equally, too, the higher phenomena of clairvoyance and thought-reading are but exalted manifestations, due to an exaltation of recipient and reflex function, of what is normal and conscious. All men, and even dogs and children (and perhaps all animals), are character and thought-readers, *i.e.*, recognise the intentions or feelings or thoughts of those about them by the signs of their mental states. Intentional production — as imitation — of the muscular acts which are the signs of sentiments in others, has been used to discover those sentiments by thus producing cerebro-mental states like those of the person tested. In like manner the volitional production of morbid states is a method of *fraudulent* production of mesmeric phenomena to which I long ago called attention.

"There cannot be a question that the O'Keys [the subjects of Dr. Elliotson's experiments at the time of writing] thus excited real phenomena ('Lancet,' vol. ii., 1837-38, and of Sept. 8th), just as hysterical girls can bring on convulsions at will, and anybody ideas, sensations, and emotions, with more or less facility. Consequently, there can be no question of the possibility of voluntary common somnambulism. 'We can excite a sensible degree of the passion of anger in our own breasts by imitating the looks and gestures which are expressive of rage' (D. Stewart, on the Active and Moral Powers. Edinburgh, 1828, p. 119). This is one of the secrets of good acting." (My Essay in Edinburgh Medical and Surgical Journal, July, 1839, p. 25.)

There is, however, an involuntary and unknowing—or, as Dr. Carpenter would say—an "unconscious" imitation or reflex production of these phenomena by affinitive impressions, of much wider manifestation than the preceding, and which deeply influences man's physical and moral nature. Sometimes this imitation is manifested knowingly, yet reflexly

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and *un*voluntarily, because the acts imitated cannot be restrained, although recognised. Hence the individual cannot help imitating the manner of speech, gestures, and other actions of those about him. It is a very common instinctive process in lower animals. Looking at the so-called imitation as a manifestation of cerebral reflex function, I may be excused saying that perhaps there is no more important chapter in biology and in mental science than this which has to demonstrate the excitor-influence of external impressions, considered as energies, upon the forms and habits of animals in general, and especially on man's moral constitution. It includes all unconsciously operating moral as well as physical influences from society and Nature. As a law, it certainly extends to the lower animals, as manifested in the so-called disguises of nature, in which there is an assimilation —as to the colour and form chiefly—of surrounding things. M. Pouchet read, at Brighton, in 1873, an account of some experiments he had made on fishes which change their colour to that of the river bed on which they rest, which clearly showed that the changes are due to impressions of reflected light received from the surrounding *media* through the optic nerves.*

These remarks refer, however, to only one portion of the great question involved—the *external* relations of the human consciousness; another, and not less important one, is the region of *internal* relations and internal impressions. This region is, as yet, almost wholly untouched by physiologists; nevertheless it contains some of the most elementary questions of mental science. The fundamental law is, that living things come into *immediate* adaptive contact with living things —corpuscle with corpuscle—cell with cell—protoplasm with protoplasm—their relations being regulated by fundamental divisions of the nervous system, named the trophic. I marked out the operation of a law of reflex nutrition and development thirty-five years ago, and gave illustrations from the physiognomical signs of the sentiments and propensities as denoted, not only by the facial expressions due to consensual muscular action, but also by features considered as the special forms into which facial bones and muscles and wrinkles are cast.†

IX.—Other instructive illustrations of the causes of mis-

* See also Comptes Rendus, 28th Dec., 1874.

† See a letter to George Combe, 7th April, 1845, in Lancet, vol. ii., 1845, p. 258; also my chapter on "The Vivifying and Co-ordinating Action of the Contents of Cells and Vessels," in Mind and Brain, vol. ii. p. 218.

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understanding which I have pointed out are to be found in the opinions either expressed by Dr. Carpenter, or implied in the context, that cerebral reflex action, automatic action of mind, and unconscious cerebration, are the correlatives, in physiology, of Sir William Hamilton's doctrine of "Mental Latency," as developed in his Lectures on Metaphysics. And here, for the better understanding of this point, I must note a verbal inaccuracy of Dr. Carpenter's. Hamilton, so far as I can find, never uses the phrase or means to denote "Latent Thought," as stated by Dr. Carpenter. The proper synonym, would be Latent *consciousness* or *Knowledge*.* But Dr. C. shall give his opinions on this point in his own language:—

"The psychologists of Germany, from the time of Leibnitz, have taught that much of our *mental* work is done *without consciousness*; but this doctrine, though systematically expounded by Sir W. Hamilton, under the designation 'Latent Thought,' has only of late attracted the attention of physiologists. Though foreshadowed by Dr. Laycock, in his memoir of 1844, on the 'Reflex Action [Function] of the Brain,' it was not expressed with sufficient clearness to obtain recognition on the part of any of those who studied that essay with the care to which its great ability entitles it. Some years afterwards, however, Dr. Carpenter was led, by considering the anatomical relation of the cerebrum to the sensorium, or centre of consciousness, to the conclusion that *ideational* changes may take place in the cerebrum of which we may be at the time *unconscious*, through the want of receptivity on the part of the sensorium, just as it is unconscious, during sleep, of the impressions made by visual images on the retina; but that the results of such changes may afterwards present themselves to the consciousness as *ideas*, elaborated by an automatic process of which we have no cognizance. This principle of action was expounded by Dr. Carpenter, under the designation 'Unconscious Cerebration,' in the fourth edition of his 'Human Physiology,' published early in 1853. . . . . The lectures of Sir W. Hamilton not having been then published, none but his own pupils were aware that the doctrine of 'Unconscious Cerebration' is really the same as that which had long been expounded by him as 'Latent Thought.'"—(Quarterly Review, Oct., 1871, p. 317.)

This statement has reference to the subject of Sir W. Hamilton's 18th Lecture, in which he proposes to solve the question—"Is the mind ever unconsciously modified?" Substitute the word *brain* for "mind," and that is *the* problem of cerebral physiology. But then he goes on at the onset to say that the question refers "in particular to the great phenomena of memory and association," and adds—

* I have discussed this question in "Mind and Brain," Vol. i., chapters headed "*Unconscious Existence*" and "*Latent Consciousness*," p. 160 *seq.*

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"The question I refer to is, whether the mind *exerts energies*, and is the subject of modifications of neither of which it is conscious?" Substitute, again, the word *brain*, or *man*, for "mind," and the word *the individual* for "it" in the question, and that again is the question we have to deal with as physiologists. This substitution may often be usefully made in reading philosophical works, as I pointed out long ago.*

And I would here suggest, that if Dr. Carpenter had realised the ambiguities and false resemblances which lurk in the terms of the metaphysician, he would have seen that what he designates unconscious cerebration is more correctly, either involuntary or unknowing cerebration or involuntary and unknown mental activity as regards the individual. I think in all Dr. Carpenter's illustrations the individual is in *some* state of consciousness, albeit not in a particular *knowing* state, or as having knowledge. To understand Hamilton's views, therefore, in reference to brain-function, it is necessary to bear in mind that he uses the words mind and consciousness sometimes synonymously to denote the same abstract thing, sometimes to denote a state of the individual as to mental activity. Mind may also be used synonymously for brain, as denoting a thing, and consciousness as denoting a state or condition of the thing, mind. But consciousness is chiefly used to denote the state of knowledge or of knowing. Hamilton, moreover, used the words *mind* and *consciousness* in the sense either of *an energy*, or as a manifestation (phenomenon) of an energy, upon which *continuous* mental life depends, and variously named mind, soul, &c. It was with these varying meanings attached to terms that he discussed two distinct problems; the one being whether consciousness, held to be both a general state and the cause of mental life, ever ceased. This he answers in the negative, maintaining, both from arguments and experiments on himself, that consciousness continues even during the most profound sleep. The other question is, virtually —although not put in that form by him—whether consciousness as knowledge, and as an energy, ever becomes *latent*, in the sense in which the physicists use the word in the phrase *latent heat*. This problem he also endeavours to solve by observation; and it is as to this kind that he "adduces some proof," by cases detailed, "of the fact that the mind [physio-

* "Even Locke scarcely ventured to refer to the brain and nervous system; but it is not a little curious that brain may be substituted for mind in numerous passages of his works. He speaks constantly of the mind as the organ; and of the will and of understanding, or perception, as the agents."—(My Essay, in Edinburgh Medical and Surgical Journal, July, 1838, p. 8.)

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logically the brain] may, and does, contain far more latent furniture than consciousness informs us [*i.e.*, all mankind] that [he or] it possesses. To simplify this discussion I shall distinguish three degrees of latency."* The first of these degrees of latency includes ordinary memory as to knowledge, and habitual or acquired consensual acts as to will. The second I give in his own words—

"The second degree of latency exists when the mind contains certain systems of knowledge or certain habits of action which it is wholly unconscious of possessing in its ordinary state, but which are revealed to consciousness in certain extraordinary exaltations of its powers. The evidence on this point shows that the mind [brain] frequently contains whole systems of knowledge, which, though in our normal state [of brain] they have faded into absolute oblivion, may in certain abnormal states [of brain], as madness, febrile delirium, somnambulism, catalepsy, &c., flash into luminous consciousness. For example, there are cases in which the extinct memory of whole languages was suddenly restored, and, what is even more remarkable, in which the faculty was exhibited of accurately repeating, in known or unknown tongues, passages which were never within the grasp of conscious memory in the normal state." (Lectures, vol. i, p. 340.)

Hamilton then proceeds to narrate illustrative cases, including insanity, febrile delirium and somnambulism. He quotes, among others, the case of the well-known German maid-servant, who, when in the delirium of fever, "was incessantly talking Latin, Greek, and Hebrew in very pompous tones." The two degrees of mental latency, as defined, obviously correspond to the organic substrata of the memory of the individual as distinct from ancestral memory, and acquired during the current life-time.†

The third degree of "mental latency" is more abstract and is physiologically ancestral. It is that which alone, Hamilton remarks, has been hitherto argued by philosophers. This being so, he adopts a certain method—viz., he considers it in itself and in its history; and this he does "because the principal difficulties which affect the problem arise from the equivocal and indeterminate language of philosophers."

"The problem, then, in regard to this class is—Are there, in ordinary, mental [cerebral] modifications, *i.e.*, mental [cerebral] activities and passivities of which we are unconscious, but which manifest their existence by effects of which we are conscious? . . . . . In the

* "Lectures on Metaphysics," vol. i, p. 339.

† See my chapter as already cited, "Journal of Mental Science," July, 1875, p. 158, *et seq.*

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question proposed, I am not only strongly inclined to the affirmative—nay, I do not hesitate to maintain that what we are conscious of is constructed out of what we are not conscious of—that our whole knowledge, in fact, is made up of the unknown and the incognisable."—(Lectures, vol. i., p. 347.)

It ought to be noted, to understand this, that Hamilton includes the origin of our "activities," considered as modes of energizing—our "conations"—in the same origin as our "passivities" or states of feeling and knowledge. Physiologically, the problem includes those mental states which have led Leibnitz and many others to the hypothesis of the pre-conscious existence of the soul. I have classed them in the chapter referred to under ancestral substrata, and made their origin evolutionary.

Hamilton's views will be more clearly understood if we read between the lines what were the practical questions he was thus endeavouring to solve, and at the same time bear in mind that to attain this end he used that speculative method which he clearly describes in the next (19th) Lecture as wholly excluding all physical and physiological research.* About the time he was appointed to the chair of Logic and Metaphysics in the University (1836), he was much interested in animal magnetism, and many experiments were made in his house. Another period of excitement began in 1850, when at least three of his colleagues in the University were making inquiries into mesmeric-magnetic phenomena. At that date the late Dr. Gregory, Professor of Chemistry, was an ardent disciple of Reichenbach, who, he believed, had discovered a new force in nature, which was named "od" force, and published a translation of Reichenbach's book in 1850. In 1851, Gregory published his "Letters to a Candid Inquirer on Animal Magnetism." At this same time two of Hamilton's other colleagues—Simpson and Hughes Bennett—tested the phenomena of animal magnetism by the physiological method, and showed that when not fraudulent, they were due to known causes and conditions of the nervous system.†

* Lectures, vol. i., p. 364, "Difficulties and Facilities of Psychological Study."

† A conjuror, calling himself Barnardo Eagle, but said to be a Yorkshire stable boy, whom I knew well, and who explained to me his method, performed clairvoyance publicly in York as an exposure of the tricks of the mesmerizers, together with other conjuring tricks, his daughter acting as his *medium* or "subject." But honesty, in this respect, was not the best policy. "Barnardo" became embarrassed; his apparatus was seized and sold; and after practising sleight-of-hand in a humble way in York, he appeared at the date in question in Edinburgh with his daughter as a *real* clairvoyante, receiving five guineas a "séance" for their united services.

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During the summer of 1851 I reviewed the whole subject for Dr. Carpenter, at that time the Editor of the Brit. and For. Med. Chir. Review, and took for my illustrations the writings of Reichenbach, Gregory, Herbert Mayo, J. Hughes Bennett, Braid, and Dr. Alex. Wood. This article appeared in the number of that Review for October, 1851. At this time, as in 1836, Hamilton was in the thick of the "mesmeric mania," as Hughes Bennett termed it.

It would be a mistake, however, to conclude that Hamilton's researches were conducted solely by the speculative method. His examination of the claims of phrenology in his controversy with George Combe shows that he could work well by the physiological method. And in investigating the functions of the cerebellum, he came to the conclusion that it "is the intracranial organ of the nutritive faculty" and "the condition of voluntary or systematic motion."* Now, if "trophic centre of the body" be substituted for "intracranial organ of the nutritive faculty," the doctrine is that which I have worked out and applied to practice for several years past (Mind and Brain, 1860, vol. ii., p. 452. § 1008). Hamilton was not merely more thoroughly acquainted with the literature of mental physiology than the majority of modern physiologists, but he made, also, more extensive and more accurate experimental researches and observations. "His tables," as he states, "extended to 1,000 brains of 50 species of animals, accurately weighed in a delicate balance.† He conducted very numerous experiments with his own hand on the brains of living animals, and had a constant succession of the latter in his house for this purpose.‡ And he was well qualified to do this, for he had studied medicine during several years both at Edinburgh and Oxford. His researches into cerebral function led him to take great interest in the translation I was making in 1850 of Unzer's *Erste Gründe*, in which work are evolved the doctrines of reflex function as to the energies at work, and he certainly had read my early papers on the subject. The following letter, addressed to me at this date by Sir William Hamilton, is conclusive evidence as to his physiological pursuits, and his special interest in the phenomena of animal magnetism:—

* Lectures, appendix, vol. i., p. 410; and Munro's Anatomy of the Brain, p. 7. Edinburgh, 1831.

† See Medical Times, May, June, and August, 1845, for his papers on the Frontal Sinuses.

‡ "Life," by Veitch, p. 117.

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North Berwick, 12th Sept., 1850.

My Dear Sir,—Mr. Colquhoun was here yesterday, and brought the "Artz," which I send you, along with Albinus. . . . I send only the first volume—there are four in all—as that volume contains his doctrine on the nervous system. You will find an extract made by me from other notes taken by an anonymous auditor of Albinus of another and earlier course of lectures on physiology by Albinus. . . . Since I wrote last I have read your article with much interest and instruction, and also large portions of your book. From this I find that you are the author of some papers in the [Edinburgh] "Medico-Chirurgical Journal," which I was much struck with at the time I read them, touching the tendency to concealment—the cunning of birds in the breeding season, with the deceits practised by their female patients on the doctors. Mulieri, ne quidem mortuæ, credendum. I hope you will find matters of interest in the "Artz." It seems an amusing farrago. Mr. Colquhoun tells me that before animal magnetism was heard of, Unzer, from his own experience, professed his belief in the fact of a transference of perception. Have you seen Herbert Mayo's late work in approbation of mesmerism? I have not; but Mr. Colquhoun* says he goes the whole hog.—Believe me, my dear sir, very truly yours, W. Hamilton.

It would be a wearisome iteration to show how Hamilton disposes of Leibnitz's "obscure ideas," "insensible perceptions," "perceptions without apperception or consciousness," which constitute his third degree of "mental latencies." Nor need I quote his discussion as to the origin of "Acquired Dexterities and Habits" (the consensual actions of Dr. Carpenter), nor his criticisms of the "mechanical theories" of Hartley and Reid. Those who are interested may see in the original that all this part of Dr. Carpenter's doctrine of unconscious cerebration is, in truth, a child of the old metaphysics, with all their ambiguities of terms. Unconscious cerebration, as applied to the explanation of table-turning, might be named unknowing conation, a useful term applied by Hamilton (after Cudworth) to denote both the act and the consciousness of the act of energising. (Lecture 11.)

So far, then, we may conclude that if the word consciousness be used, in the physiological sense, to include all states of feeling, as of pain and pleasure, and all sensa-

* Mr. Colquhoun (a member of the Scottish Bar), who thus favoured me with rare books from his library, was on very intimate terms with Sir Wm. Hamilton, and assisted him in experiments on animal magnetism. His *Isis Revelata* (1836) is an interesting history of animal-magnetic and mesmeric phenomena. He published also "Lectures on Somnambulism" and an "Exposure of Phreno-mesmerism."

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tions referred to the body as their seat and point of origin, as well as all propensities, desires, emotions, the higher sentiments, and the intellectual capabilities—and as to all these that they are, physiologically, *coincident conditions* of the individual—unconscious cerebration is not proved. If, however, the word consciousness be used to denote a *cause* of the actions of which the individual may or may not be knowable or cognisant, then it is proved.

X.—This paves the way for the consideration of the question whether consciousness of any kind is ever a cause of processes included under the phrases in question. Can cerebral reflex action be proved by direct observation and experiment, taking the physiological definition of the term consciousness? Undoubtedly, the proof is most difficult, because of unavoidable difficulties in the way of accurate observation. The primary and most important difficulty is that none except the individual, who is the subject of inquiry, can say whether, when he did any particular act at a particular time, he was in any state of consciousness at the time. I say at the time, for the inquiry must always be as to acts done in *past* time. I subjoin an illustrative example:

A gentleman of highly cultivated intellect, when he was in advanced years, consulted me as to an urinary disorder, the chief trouble of which was that he had paroxysms of intense pain—"attacks of gravel"—so-called. Mr. Syme was consulted as to the source of the pain; and since he found no calculus in the bladder, it was concluded that a renal calculus was the cause of the misery. After two years or more of this kind of suffering at intervals of varying duration, my patient became the subject of defective brain-nutrition, and finally passed into a state of such extreme senile dementia, that he had no memory and no knowledge of those about him, or of his home. One day, when visiting him, while yet at a distance, I heard him uttering the most dreadful cries, and found him just passing out of a paroxysm of pain such as he had formerly had. Within two minutes after his cries had ceased, and while his features still bore the traces of suffering, I asked him if he had suffered pain just now? "Pain? pain?" he replied, impatiently, "No! none whatever!"

This case might be held as substantiating the conclusion that the feeling termed corporeal pain is not the cause of the cries, writhings, and other signs of the feeling, if we adopted the *dictum* of the speculative method which affirms that a man cannot feel and not know it.* And even the physiolo-

* "Can I know without *knowing* that I know? Can I desire without *knowing* that I desire? Can I feel without *knowing* that I feel? This is impossible." (Sir W. Hamilton, Lectures on Metaphysics, vol. i, p. 158.)

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gist might be led to the same conclusion if he did not bear in mind what are the cerebral conditions for *knowledge;* yet I think such conclusion would be erroneous. The state of the higher strata of the convolutions was in this case such that the sufferer probably did not *know* what I meant by the word pain; or (which is equally probable) such that no conservative memory, as synesis, was possible, and consequently no *knowledge* as *reminiscence.* This defect of memory renders it difficult to say whether patients suffer pain if undergoing a painful operation when anæsthetic from chloroform. They groan, and their groans differ in cases of amputation as different parts are divided—are louder, for example, when the bone is being sawn. But I can vouch that a draught of Lethe is a blessing in these cases. Anyhow, it gives a "sweet oblivion," as Milton terms it.

Sir Wm. Hamilton encountered a similar difficulty in his attempts to prove that a man (or, as he phrased it, the mind) is conscious even in profound sleep. He had himself repeatedly awakened out of sleep, and he always found that a state of dreaming preceded full consciousness; this he, therefore, thought the normal state in sleep. But, then, this is simply the transition degree to consciousness from unconsciousness; and it is certain that a dream, although apparently of several minutes' duration, may not occupy as many seconds. If the "conscious subject" could always remember his, or its, state there would be no difficulty in solving the problem from clinical observation. It is not an uncommon event for certain epileptics to utter a loud cry of fear or horror just previously to a fit; but it is very rare to meet with a case in which the patient has the *knowledge* of having had a fit, and that he thus cried out, much less that he can say whether he experienced a feeling of mental pain or the emotion of terror at the moment of the cry. I had, however, a case of an epileptic brought under my notice in consultation with my friend Mr. Trotter, of Stockton-on-Tees, of this kind, in which the cry was not always followed by a fit, and the patient did not become unconscious. He was thus aware of the cry, and of the alarm it gave his friends, more especially his wife. But he told me in her presence that the cry meant just nothing; he was in no fear or pain at all, but he could not help it.

When my correspondence on the subject with George Combe and Professor Reid was published in the "Lancet" of 1845, in which I maintained that the states of consciousness named sensations are not causes, my late friend, Dr.

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Cowan, sent me an illustrative case of another kind, as follows:—

"Having seen some of your thoughts on reflex cerebral acts, and believing your views to be substantially, if not theoretically, correct, it struck me that any confirmative fact might, in this early stage of your inquiries, prove interesting. I am now attending a lady who evinces the reflex visual and auditory phenomena very strikingly. The shadow of a bird crossing the window, though the blinds and bed-curtains are closed, the displacement of the smallest portion of the wick of a candle, the slightest changes in the fire-light, induce a sudden jerking of the spinal muscles, extending to the arms and legs when violent, and this without the slightest mental emotion of any kind, beyond the consciousness of the movement. At times the vocal organs are implicated, and a slight cry, quite involuntary, takes place. I have no doubt that the slightest conceivable influences affecting either the eye or the ear, under the circumstances I have described, do induce, apart from all pain or mental intervention, sudden contractions of the spinal muscles in a perfectly similar manner to the contractions following the application of a stimulus to a paralyzed limb. She, of course, both sees and hears, and is conscious of [or knows] the source of impression; but, as I have before said, the effect is clearly independent of any conscious bodily or mental sensation." (Lancet, vol. ii., 1845, p. 364.)

I have, since that date, had opportunities of examining several similar cases with the same results. The acts for which I was consulted, and which annoy the patient, are those that are the natural signs of the feelings, termed emotions; but they are manifested without such feelings, and in spite of all attempts to restrain them.

Another group of signs under this head are the laughter and weeping which often constitute a part of the hysteric paroxysm. It is difficult, by cross-examination, to arrive at satisfactory information as to the state of consciousness at the moment in these paroxysms, but there are other paroxysmal cases in which laughter alone occurs at regular periods, and which occurs not only independently of the will, but cannot be restrained by volition—yet in which there is nothing "in the mind" to excite laughter. When the feet are tickled laughter with convulsive jerking of the legs occurs in some persons. If, however, in certain kinds of spinal palsy, the lower limbs and the feet be tickled, there is no laughter, although the limbs jerk. In this case the patient feels neither the tickling nor the jerking, nor laughs, because disease of the cord

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has stopped the upward course of impressions to the encephalon.

Experiments innumerable have been made on lower animals, especially on frogs, to solve the question; but they are all, without exception, fallacious, because we know that in man mere adaptive movements do not necessarily imply either the antecedence or the coincidence of consciousness, and need not therefore necessarily denote states of consciousness in lower animals. Professor Pflüger, of Bonn, experimenting on a headless frog, found that if it was hindered in its attempts to retract the one foot which he irritated, it used the other to remove the cause of the hindrance to retraction, or of the irritation; hence he concluded that the spinal cord of a frog is endowed with sensation and conscious adaptation, and then extended the conclusion to the cord of man. But, even if Pflüger's facts proved what may possibly be true, that the headless frog is conscious, and intentionally adapts its limbs to remove an irritating thing, a man with his head on is surely too widely unlike a frog with its head off to be included in the deduction. In fact, however, we know that if the conducting function of the spinal cord of a man be wholly destroyed near the axis-vertebra, he has no sensation in all the parts below. On the other hand, the same kind of reasoning which leads Pflüger to conclude that the headless frog has the endowments he attributes to its spinal cord, would be available to show that all living things whatever are conscious, since all equally display a like adaptivity. Perhaps they are, but they alone can know that they are conscious.

[Since writing this sentence, I have read Dr. Lauder Lindsay's interesting essay on "Mind in Plants." I observe he seriously concludes from a sentence in a previous paper of mine, in which I meant to say that cerebral processes, when considered as vital processes, may be compared with vital processes in plants, that I entertain the "fancy" that plants have something like brains. This is a curious illustration of the strange inferences which may follow on ambiguities of language. I do not know on what authority Dr. Lindsay attributes to the late Dr. Forbes Winslow certain opinions contained in a review of Sir B. Brodie's "Psychological Inquiries," published in "The Journal of Psychol. Medicine," for Oct., 1854 (vol. vii). It is right, however, that I should correct this statement, since I am the author of that

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review, and responsible, therefore, for all that is contained in the extract from it which Dr. Lindsay gives.]*

XI.—So far, then, it is certain that self-examination in some form is essential to solve the problems in question; but then it is self-examination conducted in relation to the mechanism. And this method serves as to all states of consciousness whatever. It must be remembered, however, that the method implies the knowledge that we have brains, and so use them in our most profound speculations that without them, or without the use of those portions available to speculation, we cannot speculate at all. So that, even to speculate satisfactorily, we need always to bear these facts in mind. That, however, is not the method of speculative philosophy, nor that which Dr. Carpenter adopts when he entirely agrees with the method of an eminent dignitary of the Roman Church. He says:—

"The writer entirely agrees with Archbishop Manning in maintaining that we have exactly the same evidence of the existence of this *self-determining power* within ourselves that we have of the existence of a *material world outside ourselves*. For, however intimate may be the functional correlation between Mind and Brain—and Abp. Manning seems disposed to go as far as the writer in recognizing this intimacy—for he says, [in Contemp. Rev., Feb., 1871, p. 469]—'There is another faculty and another agent distinct from the thinking brain. . . That we are conscious of thought and will is a fact of our internal experience. It is a fact of the universal experience of all men; this is an immediate and intuitive truth of absolute certainty. . . . . I may, therefore, lay it down as another maxim, side by side with that of Dr. Carpenter, that the decision of mankind, derived from consciousness of the existence of our living self, or personality, whereby we think, will, or act, is practically worth more than all the arguments of all the logicians who have discussed the basis of our belief in it.'—(Mental Physiology, p. 6.)

The Cardinal herein states alleged facts and draws inferences. It is probably true that every man who is *capable*

* As I have reason to suppose that a like error has been current in respect to other unsigned articles in that journal which I wrote, and which contain practical applications of my views, either to method or to practice, I may here name as amongst these—in Vol. iv (1851), "Woman in her Psychological Relations," and "Sleep, Dreaming, and Insanity." In Vol. v (1852), "The Overworked Mind." In Vol. vii (1854), "On some of the Latent Causes of Insanity;" Review of Dr. Noble's "Correlation of Psychology and Physiology;" "Modern Demonology and Divination;" and "On Demoniacal Societies and Literature." In Vol. viii (1855) I name "Oinomania," and also "Further Researches into the Reflex Function of the Brain," which first appeared in the "Brit. and For. Med. Chir. Rev.," for July, 1855.

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of abstract thought as to his living self (but all men are not capable—indeed, comparatively few men are), will recognise the origin in consciousness of the notion that he is in *act* and *fact* a living self—a person, an individual, or *one* organism. But how do all men get at the other notion—the inference—that the energy or cause by which they thus think or know, and act individually, thinks and acts *independently* of the living self? The Cardinal says it is "an intuitive truth," which means that it is knowledge acquired independently of experience, *i.e.*, is an *innate* conviction or belief. This being so, the belief "is of absolute certainty."

We can examine this conclusion physiologically. The physiological basis of all states of consciousness (as Dr. Carpenter assumes that the Cardinal admits) being brain-activity, it follows that all states of both belief and doubt have this basis. Here, therefore, a doubt arises, and we need to inquire whether "intuitive" belief, as so dependent, may ever be erroneous—whether there may not be physiologically "intuitive" errors? It is not a conclusive answer to say that what *all* men believe *must* be true. As to this point the reader needs only to be reminded of the firm belief in the motion of the sun in space and of the fixity of the earth still prevalent almost universally amongst untaught men, and for controverting which, as alleged truths of both theology and cosmogony, an infallible authority as to truth had Galileo imprisoned. This conviction of absolute certainty as to notions is truly compared with the conviction of absolute certainty as to perceptions of the external world, which the Cardinal also holds to be of undoubted authority; that is to say—that a man can infallibly rely on the testimony of his senses—as thus: I certainly *see* the sun move—I certainly *feel* that I am stationary, and that the earth is solidly fixed—*ergo*, the sun *certainly* moves, and the earth is fixed. It is precisely this belief in the infallibility of their perceptions which inspires the delusive methods of "the spiritists," zoists, mesmerists, mystics, credulous enthusiasts, *et hoc genus omne.*

Now the facts collected by the physiological method show why it is that our perceptions and beliefs and intuitions are so often erroneous, and why we cannot implicitly trust our senses. Knowing that whether we think, or doubt, or believe, we need to use our brains, the inquirer asks what part do these same brains of ours play in perceptions, intuitions and beliefs? Many mental physicians, having to deal with the unalterable beliefs and convictions of the insane, however

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absurd, learn the fallacies of brain-work; and every theologian might equally know them, if he would study the cerebral relations of beliefs, and doubts, and perceptions in the insane, or even in himself, if he dream; and thus knowing those relations, he would certainly acquire salutary doubts as to the infallibility of his senses and of his perceptions and beliefs, and so gain freedom from error.

But what are the results to Christian faith and morals of this method? For that is a test of its practical value. A detailed answer to this question would show that incessant strife as to dogmas and grossly erroneous beliefs as to the Supernatural have resulted from its use. So that the method has not been found available for ascertaining the truth as to the order of nature in thought and belief, and in faith in God. Practically, men are so constituted that they are much more ready to believe than to doubt; there is little fear, therefore, of the mass of mankind becoming "sceptics," or inquirers. Doubt, as distinct from belief, is, however, the first step to knowledge; and *verification*, the process whereby we test our belief or conclusion as to what appears to be true, is the second step. But, for all this work, healthy, well-trained, well-developed brains are necessary, and this is the practical lesson of "unconscious cerebration."

Theologians agree that the truths of science and of religion cannot differ; a truism, provided the truths be discovered. If, however, the methods used for attaining to a knowledge of truth (which, as to the present subject, is in science the knowledge of the order of nature, and in theology the knowledge of the order of Divine Providence) be wholly different, how can it be reasonably expected that the conclusions reached as truths will be similar?

It is, then, by a combination of methods that the two departments of knowledge can be made to harmonize. And since this great end is a special object of theological science, it is clearly the business of the theologian either to investigate the order of nature according to the scientific method, for himself, or, failing in this obvious duty, so to examine and verify the investigations of others.

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