ORIGINAL COMMUNICATIONS.

COMMENTARY ON SOME OF THE MORE IMPORTANT BEARINGS OF THE CASE OF SUSPENSION OF THE MENTAL FACULTIES, ETC.,

WITH REMARKS UPON THE PHILOSOPHY OF THE HUMAN MIND, AND THE PHYSIOLOGICAL PSYCHOLOGY OF MAN.

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THE republication in the ASSOCIATION JOURNAL of my "Case of Suspension of the Mental Faculties," etc., induces me to offer some observations on the most important of its psychological bearings, to the consideration of those of my professional brethren who are interested in such inquiries. My reason for doing this arises from the fact, that since the case was first published, ten years ago, great progress has been made towards a more exact knowledge and a better understanding of the functions and special endowments of the nervous centres of the encephalon, and from a conviction that the psychological bearings of the case are alike interesting and instructive. I need not say that the study of the human mind is a subject which has occupied the attention of the greatest philosophers of every age; nor need I remark how long it was enveloped in the shades of mysticism, bewildered in the mazes of metaphysical subtlety, and in the conflicting dogmata of chimerical systems. To Locke we are indebted for dispelling the mysticism of the schoolmen. Freed from the tyranny of ancient names, and regardless alike of the Stagirite and his categories, he discarded the syllogism, and instituted a searching analysis of the phenomena of thought. In the metaphysical world, like the immortal Newton in the mathematical world, he stands forth pre-eminent. No age or nation ever produced two greater luminaries of science. They live in the veneration of their countrymen, and are borne down the stream of time with a reputation ever gathering, and with the triumphs of a distinction that will never die.

The doctrines of mind rest essentially on the basis of our physiological composition—they form a part of the physiology of man. For, however it may be attempted to separate intellectual and moral from animal and corporeal man, and however we may reason about our intellectual and moral nature, apart from our animal and bodily constitution, it is never to be forgotten that they are united in this life, forming one and a composite system of mutual dependence and reciprocal action. Hence arises the importance of medical psychology, of tracing the relations and reciprocal actions of mental and bodily phenomena, and the necessity of noting and of studying the psychological manifestions or symptoms as they become developed, and especially in affections of the brain and nervous system. It has been well observed by Feuchtersleben, in his admirable treatise, "Where psychical phenomena appear *abnormal*, there is *mental disorder*, which has its root in the mind, so far as this is manifested through the sensual organs; and has its root in the body, so far as this is the organ of the mind. To search after the phenomena in which these relations are revealed, with the unprejudiced eye of experience, to investigate them scientifically in every point, that is of importance to the physician, and to collect them into one whole is the province of medical psychology." (*Medical Psychology*. Translated by the Sydenham Society, 1847.)

Impressed with the idea that physiological bears to medical psychology a relationship analogous to that which physiology does to pathology, a clear comprehension of the principles of the former appears to me to be essentially necessary for a proper and full appreciation of the abnormal and morbid phenomena of the latter.

The human mind must be studied in connection with the material conditions of the encephalon, since it is upon the vesicular matter of the encephalic ganglia that the mind is dependent for the manifestation of all its activities in this life. And it has long been my own settled conviction that the metaphysician can make little progress independently of the physiologist, and that it is to the medical philosopher and physiologist we are to look for the most valuable contributions to the science of mind.

The case of the young woman, on which the present remarks are intended as a comment, presents for our consideration a rare instance of *second consciousness*—of the abeyance of intellectual action and the exhibition of mere sensational and instinctive life, and, in the progressive stages of her recovery, some instructive lessons. In it the independent action of the sensory ganglia, at a time when the cerebrum was incapable of receiving and acting upon sensorial impressions, the distinction between propensity and instinct, and the development of the composite nature of the true emotions, are all strikingly exemplified; and, if I am not greatly mistaken, it throws some light upon the seat and source of the inner sensibilities, associated with the emotional states.

After the complete recovery of my patient, and on her return home from Brighton in good health, and in the exercise and enjoyment of her mental faculties and bodily powers, I drew up the history of the case with great care, and to the best of my ability, with the view of its being read at one of the meetings of the most distinguished of our medical societies in London—the Royal Medical and Chirurgical—of which, at the time, I was a member of the Council. Defeated in this object by the deliberate decision of the Council, not by the mere act of its secretaries, but why and wherefore it is not for me to say, I sent the case, without note or comment, for insertion in the pages of the *Lancet*, and I soon had the satisfaction of finding that it had attracted the notice of some of the ablest physiologists of the age—of men the best qualified to appreciate the value and importance of its psychological bearings.

About twelve months afterwards, my attention was directed to Dr. Carpenter's masterly critique in vol. xxii of the *British and Foreign Medical Review*, on Dr. Noble's work *On the Brain and its Physiology*. To those who have read that able article, I need not say how deeply I was interested in it; not only on account of the new views which were there for the first time enunciated and expounded, and with which the name of Dr. Carpenter is indelibly associated, but also for the elucidation and confirmation so strikingly afforded to these views by this young woman's case. My friend Dr. Noble has candidly avowed the revolutionising influence which this review produced upon his mind; and his *Elements of Psychological Medicine* bear ample testimony to the fact. I thought it due to Dr. Carpenter, immediately after reading his critique, to submit my case to his notice, under the impression, if he had not already seen it, that such an exemplification and corroboration of some of the views which he had propounded, could not fail of being gratifying to him. It had not been brought under Dr. Carpenter's notice, but at once he saw the importance of its psychological bearings, and I soon had from him the assurance that it should not be lost to medical science. What he has since written and published in connection with this subject, shows how fully he has redeemed his promise. His designation of the case speaks for itself—"as the most remarkable case, up to this time, as yet put upon record, in illustrating the nature of a purely *sensorial* and *instinctive*, as distinguished from an *intelligent existence*, and the gradual nature of the transition from one to the other." (Dr. Carpenter's *Principles of Human Physiology*, 5th edition, 1855.)

I may here repeat, what I have elsewhere stated, that "among living physiologists, Dr. Carpenter has done more than any other man to specialise the functions of the nervous centres of the encephalon; and through comparative anatomy, by analytical reasoning and strict induction, to advance our knowledge of the physiological psychology of man. To my mind, he has fully established the following important positions:—

1. The independent character of the sensory ganglia as

instruments of sensation, and of respondent consensual and instinctive actions.

2. The superadded character of the cerebrum or great hemispherical ganglia, as the phrenic ganglia of the brain, —the seat of our intellectual operations and reasoning processes, where ideas are formed, and where the will exerts its power.

3. The composite or mixed nature of the propensities, emotions, and moral feelings, as compounded of ideas and sensorial feelings of pleasure and pain—the former, their intellectual or psychical element, having their seat in the hemispherical ganglia, and the latter or sensational, in the sensorium commune or sensory ganglia.

The establishment of these positions, the independent character of the sensory ganglia, and the restriction of the functions of the cerebrum to the operations of the intellect and the will, this separation and localisation of the centres of sensation and ideation, of feeling and of thought, and the development of the composite nature of the active powers of the mind, the emotions, propensities, and passions, constitute a real and a most important advance in psychological science."*

And Dr. Carpenter's chapters, in the fifth and last edition of his *Human Physiology*, "On the Functions of the Cerebro-Spinal Nervous System, and on the Mind and its Operations," I cannot too earnestly recommend to the study of all who are interested in the physiological psychology of man.†

But to proceed: what was the mental condition of this young woman, at my first visit, three weeks after the accident? Was it not a state of second babyhood,—of instinctive and sensational being? For we are at birth the mere creatures of sensation and instinct, and the first stage of our psychological progress is purely one of sensational consciousness.

When I first saw her not only was the cerebrum, the centre of intellectual action and volitional power, benumbed or paralysed,—for her mental faculties were in complete abeyance,—but all the avenues of the sensational consciousness were closed, with the exception of sight and touch; for she could neither hear nor speak, smell nor taste. Now sensational consciousness and instinctive and consensual actions, as they have been aptly designated by Dr. Carpenter, constitute the lowest, and consequently the earliest stage of our psychological existence. And such was this young woman's condition; for all her former knowledge and past experience were obliterated, or, at least, for months buried in oblivion.

Sensation is the link in the chain of being between the vital and mental forces, connecting indissolubly together the conscious and the unconscious processes. "As a complex act, it lies partly within and partly without the consciousness; it passes the line which separates the physical from the mental, enters the light of consciousness, and thus becomes a fact, psychological as well as physiological." (Morrell's *Psychology*.)

With the animal processes, sensations are inseparably connected, and with sensations their allied appetites and instincts. But sensations are the primary phenomena, and form the starting point to the other two, for it is obviously manifest that an appetite or instinct must in all cases be preceded or accompanied by a sensation.

The instincts are the untaught activities and capacities of our animal nature. As internal subjective feelings they are innate, and arise in obedience to certain laws of our nature, or are brought into play in direct respondence to stimuli acting upon the sensorium commune from without.

As for consciousness itself, that is an ultimate fact in animal existence, beyond which we cannot go; it is an attribute of animal life, and self-consciousness is the primary condition of intelligence: in a word, it is mental existence.

Consciousness as a succession of states is awakened from without, the infant mind responding solely to the influence of physical stimuli from without, or of instinctive feelings from within. The senses come into play from the moment of birth, and soon acquire the utmost perfection of which they are capable. Thus roused into activity, the infant's acts are all consensual and instinctive. To it the inward world is everything, and the outward world is nothing. Its sensations are all subjective. The sudden light indeed may dazzle, and a loud noise may startle; but until the perceptive consciousness has been awakened, the mind is in a state of isolation,—it takes no cognisance of an outward world, nor did this young woman when I first saw her. With the loss of perception, and its associates memory and volition, ideation was suspended, and so too was the power of speech. All the channels of the sensational consciousness were closed, with the exception of sight and touch, and, at that time, through them no ideas were aroused, though all the automatic movements unconnected with sensation were active, and various respondent and consensual movements were readily exerted through them. She had no notion that she was at home, nor the least knowledge of anything about her. She did not even know her own mother, who attended upon her with the most unwearied assiduity and kindness. Wherever she was placed, there she remained throughout the whole day, making no voluntary effort of any kind, manifesting no uneasiness for anything to eat or to drink, and taking no heed of what was going on around her. The power of ideation was not present, and memory and volition were in abeyance, for the perceptive consciousness of external existences was suspended. Still, at short distances her sight was quick, and the general sensibility upon the surface of the body was so exalted that the slightest touch would startle her. But unless she were actually touched, or an object or person were so placed before her eyes that she could not avoid looking upon the one or the other, she seemed to be quite lost to everything that was going on around her. Of all the special senses next to touch, sight is the most important. But, as intuitional acts, sensibility to touch, the consciousness of feeling, and the capability of experiencing pleasure and pain through the medium of tactile impressions, are the simplest and lowest, but at the same time the most universal in nature. The sensation of resistance, or sense of touch, is the lowest,—it is the *earth-sense* of Oken: of all the special senses, however, it is the most extensive in its application, and the most essentially important to human existence. The intuitions of all the senses are strictly consensual and confined to the sensible phenomena of matter, without conveying to us any knowledge whatever of the bodily substances with which they may be connected. Thus we see light, we hear sound, we smell odour, we taste sapor, and we feel pain, heat, or cold.

Mr. Wedgewood has well observed: "It is hardly necessary to premise that we have no knowledge of body by any of the five senses. What I immediately perceive by sense is the sensible phenomenon itself, and not the bodily substance with which it may be locally connected, either as the proximate cause of the sensation, or as the organ by, or in which it is felt. When I suffer toothache, or when a pin is run into me unawares, the thing of which I have the actual apprehension is the pain I suffer, not the bodily substance of the pin and the tooth. When a gun goes off before my windows, what I hear, or perceive by the ear, is neither the bodily gun nor the vibrations of the air by which the material action is conveyed to my ear, but the sound itself. When I gaze upon the stars, the visible image before my eyes affords a subjective object of contemplation, apart from all speculation as to the bodily nature of the object seen. Thus the exercise of the senses displays to us five elementary modes of being, logically unconnected with the notion of bodily substance,—five kinds of being upon which we may think independent of all intellectual reference to a bodily support." (H. Wedge-

* Case of Tubercles in the Brain, with remarks Physiological and Psychological on the Functions of the Nervous Centres, involved in the Disease. (ASSOCIATION JOURNAL, August 11th, 1854.)

† The Psychological portion of the Chapter, "On the Functions of the Nervous System", has been pronounced by a competent and independent judge, to be "the most profound treatise on the subject which the world has seen." (Westminster Review for July 1855.)

wood's *Tract on the Cambridge Philosophical Transactions.* Quoted by Morrell, p. 138.)

The special senses have been emphatically styled the "alphabet of intelligence". They are the inlets of the materials of knowledge, and constitute, with their allied or consensual feelings, appetites and instincts, the inferior region of the true or conscious mind. They occupy a prominent, not to say a predominant, part of the mental life of the great mass of the inferior animals, and a very considerable portion of the far more complicated thread of human existence. Each of the sensory ganglia of the special senses conveys to the mind a different kind of intelligence; and they are obviously the seat of the feelings of pleasure and pain, inseparably connected with the exercise of their functional endowments, as well as the centres and source of those motor impulses which react upon the muscular system, independently of thought or volition, as was well seen in this young woman's case. For, while the functions of the cerebrum were suspended, and it was incapable of receiving and acting upon the sensorial impressions of sight and touch, there were daily displayed, and very often two or three times in the course of the day, disruptive discharges of the nervous force, producing fits of convulsive agitation, spasmodic rigidity, and insensibility. So great indeed was the excited polarity of the nervous force, that the urine and fæces were rarely passed without the induction of one of these reflex attacks of convulsive agitation.

The sensory ganglia are the seat of the sensational consciousness of whatever kind, and the cranio-spinal axis the source of all the movements of the body. For in man, and throughout the vertebrate sub-kingdom, the sentient and sensori-motor apparatus, the system of automatic life and instinctive action subservient to sensations, and to those consensual and instinctive actions which are indissolubly linked on with sensations, consists of the spinal axis and nerves, the medulla oblongata, and the chain of sensory ganglia, including those of the special senses at its summit. If we follow up the cranial prolongation of the spinal cord, the medulla oblongata, into the fibrous strands of which we see imbedded the respiratory, auditory, and gustatory ganglia, and carefully trace out its ramifying branches, we find it sending off distinct fasciculi of fibres to the ganglionic centres at its summit, to the cerebellum, the corpora quadrigemena, the thalami optici, corpora striata, and to the peduncles of the olfactory ganglia. And thus we see, to the sole exclusion of the cerebrum, whose connexions are strictly commissural, that the whole series of the ganglia of the cerebro-spinal system, including those of the special senses, are in direct fibrous connection with the cranio-spinal axis, and form with it, as an aggregate or whole, the sensorium commune, or great circle of sensational consciousness and instinctive action.

Now, upon this sensory apparatus of the sensational consciousness, the cerebrum is superimposed and superadded, for purposes and offices the noblest and the most exalted in the economy of man. It is the phrenic ganglion of the brain, the centre of intellectual action and volitional power, combining sensations and instinctive actions with the higher attributes of mind. It is the crowning peculiarity of the vertebrata; and in man it is so enormously developed that it completely overlaps and tops the other encephalic ganglia. But of the independent action of the sensory ganglia, while the functions of the cerebrum were benumbed or paralysed, we have in this young woman's case an apposite example; for, at a time when she knew no one, and could not be made to comprehend the letters of the alphabet; when all her former knowledge (for she had been fond of reading) and past experience were buried in oblivion, the automatic actions, and the animal instincts—the untaught activities of the mind—were in full operation. The intuitions of sight and touch were not suspended, nor were the elementary emotional impulses or feelings, especially of fear, which are associated with them; for the slightest touch would startle, and the sight of running water alarm her; and often a reflex fit of spasmodic agitation would follow. The *instinct* for food was present and active, but she required to be fed; for the *propensity* for food was absent. In hunger, we have both appetite and desire; but she manifested no desire either for food or drink, however long she might have been kept without it, and however uneasy the sensations of hunger and thirst may have been to her. She made no voluntary effort to procure either food or drink, or even to feed herself when it was placed before her. The sensations or cravings of hunger and thirst, as subjective conditions, have their seat in the vesicular nervous tissue of the stomach and mouth; but the propensity or desire for food, and the devising of means and modes for securing it, point to a psychical or cerebral element as well as to a sensory one. We all know by experience how a savoury odour will cause the mouth to water; but it is equally true that the very thought of it, the mere recollection of the idealised sensation, will produce the same effect. And if we follow up the cerebral relations of the olfactory peduncles, the special ganglia of smell, we find that they are not only in connexion with the thalami optici, but also that they are directly connected with the primitive basilar convolutions which surround the fissura Sylvii, and which are coeval in point of existence with the fissure itself.

And thus we see that, in her case, the distinction between propensity and instinct, so clearly pointed out by Dr. Carpenter in his able analysis, was well exemplified. "Instinct", says he, "is an expression for a certain series of phenomena directed towards a given purpose, but not really involving any other physiological or psychological actions than sensations and respondent movements; whilst propensity is a desire for gratification, involving an idea of the object."

All her animal wants were most sedulously attended to by her mother; and, as she had neither taste nor smell, she ate and drank alike indifferently whatever was presented to her. After a time, however, we find her as it were automatically feeding herself; but her mother was obliged to begin the process, and to repeat the lesson every day: for memory she had none; far less, indeed, than is manifested by a child in relation to its bodily wants. Memory and volition—all voluntary efforts—were alike in abeyance; while the powers of perception and ideation were suspended; and with them the faculty of speech.

After the lapse of a little time, however, and while still in this state of abnormal innervation, the perceptive consciousness gradually redawned within her, and she began, *de novo*, like a child, to acquire ideas and to register experience. At first these were obviously sensorial. Her pleasure in little rosebuds, in looking at flowers, and in the harmony of colours, on the one hand, and her fear and shuddering dread at the sight of running water, on the other, lead to this conclusion.

But another and a farther step was made in psychical advancement when she began to take an interest in looking at pictures and prints; and when the sight of a troubled sea, there depicted, not only roused up feelings of danger and alarm, but the notion or idea of water in association with them. Then the power of ideation was being regained; and it was clear that the perceptive consciousness was being roused and reawakened from its state of lethargy. The cerebral suspension was giving way. But this reawakening of dormant functions, of perception and ideation, when there were only two of the sensorial channels open, though progressive, was necessarily both limited and slow. Her power of utterance was suddenly regained through sensorial or rather emotional excitement. The sight of her mother in excessive anguish and distress opened wide the floodgates of her inner sensibility; volition was aroused; and the barrier was swept away which had so long spell-bound her in silence. In the excess of feeling and emotion, her returning volitional power burst forth, like a disruptive discharge of the nervous force, and she suddenly ejaculated, though with hesitation, "What's the matter?" But with the power of utterance the memory of words was not restored. The power of articulation, or faculty of speech, is one thing; and the memory of words—the sign-

language of ideas—is another. Her vocabulary was at first restricted to the pronoun "this"; and while the power of ideation was so weak, and the volitional energy was wanting, perfect speech was not to be expected.* It has been well remarked by Dr. Todd, "Perfect power of speech—that is, the power of expressing our thoughts in suitable language—depends upon the due relation between the centre of volition and of intellectual action." And in the present case, the loss of speech was evidently due to the suspension of the perceptive consciousness; for, with the loss of perception, ideation and volition were suspended, and with them the power of speech.

As the power of ideation was being re-established, her returning volitional energy, suddenly roused into an intensity of action by the sight of her mother's agitation and distress, brought again and suddenly into play her lost power of articulate speech. From this time, she began to articulate a few words; but she did not call things by their right names; and as long as the centre of intellectual action was in an abnormal condition, so long was the *perfect power of speech* in abeyance.

Perception is the portal to intellectual action: it is but one and the first step, in our psychological progress, above sensation. Still these two states of the consciousness, the sensational and the perceptive, though so closely allied, are not to be confounded; they are distinct mental states, and have their seat in different nervous centres. The sensory ganglia of the sensori-motor apparatus are the seat of the sensational consciousness, and the cerebrum exclusively of the perceptive. Sensation or feeling, as identical with simple consciousness, is a subjective condition, and is an attribute, not of the cerebrum, but of the sensorium commune, or sensory ganglia; for in myriads of animals no cerebrum exists; and to them how can we deny the consciousness of feeling, the experiencing of pleasure and of pain?

The mechanism (so to speak) of the action of sensation and perception is different: the one is a single, the other a complex act. In sensation, it is single, and affected through the direct agency of the sensory ganglia; but in perception, a double ganglion action is involved; and sensations or sensible impressions, to reach the perceptive consciousness, and to become *idealised*, require to be transmitted from the sensorium to the cerebrum; for ideation is there effected.

Sensation is wholly subjective in relation to knowledge; in it, the conscious mind is solely absorbed in its own subjective conditions or feelings, as induced by the bodily states; but in perception, its attention is transferred from these to their interpretation, as the expression of outwardly existing facts; implying a consciousness of the object which induced the sensation or impression—a recognition of its cause as a something external to the mind itself—*an outward reality*.

Perception, and its associate volition, are the functions by means of which the mind maintains its communication with the external world; and the great and fundamental mystery of life consists in the relation of consciousness and volition to the functions of the special senses, and the other cerebral organs, which connect the sentient and percipient being with its own bodily organisation and with the world without. And in affirming that sensation, perception, emotion, thought, and volition, are functions of the nervous system, it must be remembered, it is only maintained that the vesicular matter of the nervous centres of the encephalon furnishes the material conditions under which these phenomena are manifested in this life.

As to the nature of the connexion of the encephalon and the sentient and percipient mind, it has been well observed by an acute metaphysician, "We never shall be able to understand more than is involved in the simple fact, that a certain affection of the nervous system precedes immediately a certain affection of the mind." (*Lectures on the Philosophy of the Human Mind*, by Dr. Brown.)

It is no longer a subject of dispute that the brain or encephalon is the material organ of the mind, where the ultimate molecular changes precede mental states, and where the mandates of the will originate those which terminate in acts of volition.

But, as to the abstract nature or essence of mind, that is a problem which belongs to the same category as the nature of life. We know nothing of life apart from organization; and we have no evidences of mind independently of a brain and nervous system. An organism is required for the display of vital phenomena, and an encephalon for the manifestations of mind. Life has accordingly been defined "as the collective expression for a series of phenomena, which take place *exclusively* in bodies that are organised;" and "mind as the functional power of the living brain". The essential phenomena, however, of matter and mind, are so completely antagonistic, it is in vain that we attempt to establish any relationship of analogy or identity between them; but such is not the case in respect to MIND and FORCE, to the *nervous* and *mental forces;* for they are perpetually interchanged and interchangeable. The correlations of the forces, of the physical and vital, the nervous and mental, and the genesis and development of these forces in the human organism, is a most interesting and absorbing inquiry; it has engaged the attention of the ablest physiologists and most profound thinkers amongst us. The labours of Matteucci have not been fruitless. What Mr. Grove has done as to the correlations of the physical, that Dr. Carpenter has effected in respect to the physical and vital, the nervous and mental forces; and to his valuable paper in the *Philosophical Transactions of the Royal Society*, and to the chapters, in the last edition of his *Human Physiology*, on the Correlations of Physiology and Psychology, I would beg to refer all who are interested in such an absorbing inquiry. "We have evidence," says he, "in what we know of the physiological conditions under which *mind* produces *motion*, that certains forms of vital force constitute the connecting link between the two; and it is difficult to see that the dynamical agency which we term *will* is more removed from *nerve-force* on the one hand, than *nerve-force* is removed from *motor-force* on the other. Each, in giving origin to the next, is itself expended, or ceases to exist *as such;* and each bears, in its own intensity, a precise relation to that of its antecedent and its consequent. But we have not only evidence of the excitement of nerve-force by mental agency: the converse is equally true; mental activity being excited by nerve-force. For this is the case in every act in which our consciousness is excited through the instrumentality of the sensorium, whether its conditions be affected by impressions made upon the organs of sense, or by changes in the cerebrum itself; a certain active condition of the nervous matter of the sensorium being (we have every reason to believe) the immediate antecedent of all consciousness, whether sensational or ideational. And thus we are led to perceive that, as the power of the will can develope nervous activity, and as the nerve-force can develope mental activity, there must be a *correlation* between these two modes of dynamical agency, which is not less intimate and complete than that which exists between the nerve-force on the one hand and electricity and heat on the other. This idea of correlation of forces will be found

* Pathological researches have led me to espouse the opinion of Gall, so ably maintained by M. Bouilland in France, as to the localisation of the faculty of speech in the anterior lobes of the cerebrum. I incidentally brought the subject before the notice of the profession, in a paper "On a Case of Hemiplegia, with Cerebral Softening, and in which the loss of Speech was a prominent symptom"; read before the Royal Medical and Chirurgical Society, June 25th, 1850, and printed in the "Lancet" of October 26th, and November 2nd, 1850. The case is an interesting and instructive one: the patient had three apoplectic seizures, and from the time of her first attack to the day of her death she was constantly under my notice. Besides having watched her narrowly, and carefully recorded the changes in her symptoms, I had the satisfaction of a *post mortem* inspection, and the advantage of Dr. Todd's microscopic examination of the diseased cerebral substance.

The case is carefully and fully reviewed in the "British and Foreign Medico-Chirurgical Review", vol. vii, p. 390-93. The reviewer does not hesitate to express his mind freely, as to the *injustice* done both to myself and the profession, by its exclusion from the current volume of the Society's Transactions; and remarks, "We must own ourselves at a loss to understand the meaning of this exclusion." And then seriously asks, "Does it depend upon ignorance of the real value of the facts here set forth? Or does it arise from indisposition to receive such contributions from a gentleman who avowedly belongs to the 'amphibious' order of 'general practitioners'. But be that as it may, the case, or the review of it, will be found worthy of the notice of all who are interested in cerebral disease."

completely to harmonise with those phenomena which indicate the influence of physical conditions in the determination of mental states; whilst, on the other hand, it explains that relation between emotional excitement and bodily change which is manifested in the subsidence of the former when it has expended itself in the production of the latter.

"And further, it will be found no less applicable of explanation of all that automatic action of the mind which consists in the succession of ideas according to certain 'laws of thought', and without the exercise of any control or direction on the part of the individual to whose consciousness they present themselves, and which manifests itself in the action of those ideas upon the centres of movement. For this succession may be regarded as the exponent of a series of changes taking place in the cerebrum itself, in respondence to impressions made upon it; whilst the movements which proceed from these must be considered as being no less the results of its 'reflex' or 'ideo-motor' operation, than are the 'consensual' of the reflex action of the sensory ganglia, and the excitor motor of that of the spinal cord.

"For all physiological purposes, we may consider the nervous matter of the cerebrum as the material substratum through which the metamorphosis of nerve-force into mind-force, and of mind-force into nerve-force, is effected; and as every such metamorphosis involves, like other analogous transformations, a change in the state of the matter through which it is effected, so should we expect that mental activity would involve the disintegration of the nervous substance which thus administers to it; and such appears, from a variety of evidence, to be really the case." (*Human Physiology*, p. 533-4, fifth edition.)

There were *two* incidents or facts in the history of this young woman's life which had been most deeply and indelibly impressed upon the consciousness; and the prominent operative influence of one of them, in re-awakening the perceptive consciousness, cannot be noted and followed without interest, whilst the bearing of both upon the nature and composite character of the emotional part of our mental constitution, is alike instructive and curious; and, if I am not greatly mistaken, throws some light upon the seat of the feelings associated with the emotional states. The first in order and importance of these was the deep rooted attachment, and heartfelt affection she had for her lover; and the other was her fall into the river,—the accident in consequence of which her mental faculties had been suspended.

We see from the narrative, that her lover was an object of interest when nothing else could rouse her. Nothing seemed to give her so much pleasure as his presence. At a time when she did not remember from one hour to another what she was doing, she looked anxiously for the opening of the door about the time he was accustomed to pay his visit; and if he came not, she was fidgety and fretful throughout the evening. When, by her removal into the country, she lost sight of him for some time, she became unhappy and irritable, manifested no pleasure in anything, and suffered from fits of spasmodic rigidity and insensibility. When, on the other hand, he remained constantly near her, she improved in bodily health, early associations were gradually awakened, and her intellectual powers and memory of words progressively returned. "Now here", says Dr. Carpenter, in commenting on the case, "we see clearly the composite nature of the emotion of affection. At first, there was simple pleasure in the presence of her lover, excited by the gratification which the impress of former associations had connected with sensation. Afterwards, however, it was evident that the pleasure became connected with the idea; she thought of him when absent, expected his return (even showing a power of measuring time, when she had no memory for anything else), and manifested discomfort if he did not make his appearance. Here we see the true emotion, namely, the association of pleasure with the idea, and the manner in which the desire would spring out of it. The desire, in her then condition, would be inoperative in causing voluntary acts for its gratification; and simply because there was no intellect for it to act upon. Her mental powers, however, were gradually returning. She took greater heed of the objects by which she was surrounded; and, on one occasion, seeing her mother in a state of excessive agitation and grief, she became herself excited, and on the emotional excitement of the moment suddenly ejaculated, with some hesitation, "What's the matter?' Wild flowers, for which she had shown quite a passion when a little child, were the first objects which she called by their right names; and it is remarkable that her interest in these, and her recollection of their names, should have manifested itself at a time when she exhibited not the least recollection of the 'old familiar friends and places' of her childhood. As her intellect gradually expanded, and her ideas became more numerous and definite, they manifested themselves chiefly in the form of emotions; that is, the chief indications of them were through the signs of emotional excitements." (Dr. Carpenter's *Human Physiology*, 5th edition, pp. 669-70.)

It was under a sudden and overwhelming emotional excitement, and of jealousy, that the catastrophe occurred, which, happily for her, proved critical and sanitary. For when the insensibility of some hours' duration had passed off, she was no longer spell bound. The veil of oblivion was withdrawn; and, as if awakening from a sleep of twelve months' duration,—for she had not the slightest remembrance of anything which had taken place in the interval,—she awoke in the possession of her natural faculties and former knowledge, and found herself surrounded by her familiar friends and acquaintances in the old house, at Shoreham.

Emotional sensibility differs essentially from common sensation. We cannot identify in the consciousness, hopes and fears, joys and sorrows, with the feelings of common sensation. They are distinct mental states. The emotional differs from the sensational consciousness. But the simple elementary emotional feelings, like the instinctive, are manifestly consensual, and independent of thought or volition. They bear the same relation to the true emotions which the instincts do to the propensities. Thus, for instance, in laughter, the expression of the joyous emotion is simply and strictly consensual, when excited by titillation upon the surface of the body; but in "laughter holding both her sides", provoked by the presence of ludicrous ideas on the mind, it is truly emotional. In the one case, the physical impulse upon the surface is transmitted upwards to the thalami optici; in the other, it passes downwards to them from the cerebrum; and, alike in both, the motor impulses are evoked, and the joyous emotion is manifested.

And so, in this young woman's case, when the sight of agitated water, or its sudden application to the surface of her body, excited fear and produced convulsive shuddering, at the time her mental faculties were in abeyance, the effect was strictly of a consensual emotional kind; but after she had so far recovered the faculties of observation and ideation as to be painfully sensible that her lover was faithless, and paying attention to another, the feeling of jealousy was roused within her, and the sequelæ partook of a truly emotional character. And thus we see, that alike in the animal propensities, and the emotional sensibilities, ideation is involved. It is an intermediate link between the instinctive and intuitional elementary emotional feelings on the one hand, and the higher operations of thought and volition on the other. As a subordinate and connecting link between emotion and volition, it is sometimes in subordination to the one, and sometimes to the other.

Again, in regard to her accident; at the time when she had no recollection from day to day what she had been doing, and did not know one day from another, emotional feelings of terror or fright, followed by an attack of insensibility and spasmodic rigidity, could be most readily excited in association with water; so easily indeed, that the sight of running water, its merely being poured from one vessel to another, made her shudder and tremble, and occasioned a fit of spasmodic rigidity and insensibility, to avoid which, in the act of washing her hands, they were merely placed

in the water. Now here it is obvious that the spectrum of the agitated water traversing the optic nerves, from the retina to the corpora quadrigemina, was sufficient to arouse into immediate activity those emotional feelings of alarm and terror which had been impressed there in association with water; and the motor impulses thus evoked reacted upon the muscular system in a disruptive discharge of the nervous force, producing a fit of spasmodic agitation, insensibility, and rigidity. But as the same effects, and even of a more alarming character, followed, the attempts to pour water upon her head through a common colander, and were thus excited through sudden tactile impressions, we are necessarily led to the inference of a common centre as the seat of these feelings, or to an identity or unity in the functions of the nervous centres concerned—the corpora quadrigemina, and the thalami optici. It is to be remembered that, at the time, sight and touch were the only unclosed avenues to the sensational consciousness, and that alike, and instantly through either of these channels, the same emotional effects were produced. It is worthy of remark, that in the brain of the fish, the corpora quadrigemina and thalami optici are contained in one mass, forming the optic lobes, and presenting, in point of magnitude, a striking contrast to their rudimental hemispheres. This fusion is instructive, as indicating, at least, the closeness of their union, if not an identity of function, and it harmonizes well in fishes with the activity of their sight, and the character of their consensual movements.

Now, the corpora quadrigemina are not simply the ganglia of vision (which function some physiologists have restricted to the corpora geniculata), but, like the thalami optici, they have a higher and a wider range of action, and are manifestly the seat of those objective emotional feelings and motor impulses which are roused into activity through the instrumentality of sight. We have a daily and familiar proof and illustration of this in the infant's laughing eye, and its expression of joyous emotion, as the perceptive consciousness begins to dawn. We see it in the effect produced by making strange faces at young children; we hear it in their scream of excited alarm, and we behold it in the convulsive fit or shuddering agitation which sometimes follows. A more striking illustration, perhaps, could not be found upon record of the susceptibility to emotional excitement, at a time when the mental faculties were in such a state of abeyance, than this young woman's case presents. But then we have in evidence that it was not through sight alone that these feelings of terror and of fright were excited, but also through tactile impressions, of which the thalami optici are the encephalic centres.

Sight is the highest, most refined, and objective of the senses: it is the *light-sense* of Oken. To see is to know; intellectually, sight is knowledge, for the visual impressions on the retina go direct to the mind. Now while, on the one hand, it is abundantly manifest that the corpora quadrigemina are the seat of those objective emotional feelings and motor impulses, which are roused into activity through the agency of sight, I think, on the other hand, we may fairly, and are entitled to infer, that the thalami optici, the seat of our inner sensibility, are the common centres of all the other objective and subjective feelings associated with the emotional states. For though it cannot be denied that simple emotional feelings and motor impulses may be, nay are, excited and roused into activity through all the special senses by impressions from without, it must not be forgotten that the thalami optici are in reality the common centre and point of union to the sensory nerves. They are not the mere centres of tactile sensation, but the essential ganglia of the sensory tracts. Emplanted upon the sensory tracts of the crura cerebri and medulla oblongata, they are in direct fibrous commissural connexion with the respiratory, gustatory, and auditory ganglia, and with the optic nerves, by a direct passage of a portion of their roots, and with the peduncles of the olfactory nerves, through the medium of the fornix; and thus we have proof that a connecting nervous thread ramifies throughout the entire circle of special sensations, and that the thalami optici form a common foci and point of union to the sensory nerves. Each of the ganglia of the special senses conveys to the sensational consciousness a different kind of intelligence; but as they are all in fibrous connexion with the thalami optici, here we find their common centre and point of union. And "without some point of unity, some fixed reality, running like a continuous thread through all the phenomena of the special senses", it has been well observed by Mr. Morrell, that "our whole sensational life, would be a succession of mere impressions; each point of existence being distinct from the other, and each removed sensation like a momentary life and death of the whole individual. In this chaos of impressions, accordingly, and around a middle and uniting point, they all tend to cluster; order begins to ensue; a dim connexion between the phenomena of the different senses manifests itself, and the shadow of a continuous life, of which these impressions are but the passing phases, is projected from out of the dark confusion.

"This shadow is the first rise of self-consciousness, the middle point of our phenomenal existence, the unity around which all our sensations, from the earliest period, are gradually marshalled. The primary form of self-consciousness accordingly is the unity of senses." (Morrell's *Elements of Psychology*.)

The powers of sensation and of locomotion are the two great functions typical of animal life, and the thalami optici and corpora striata are their encephalic ganglionic centres. They are the great sensori-motor centres of the brain, emplanted respectively upon the sensory and motor tracts of the medulla oblongata; in them the sensory and motor fibres terminate. And Dr. Todd and Mr. Bowman have clearly shewn that there exists between them a relation analogous and as close as that which subsists between the anterior and posterior peaks of grey matter in the cord;* and, as in the case of the spinal cord, the anterior peaks, or segmental ganglia, issue motor impulses in respondence to sensations excited through the posterior peaks, so, in the case of the encephalon; the corpora striata propagate motor impulses in respondence to excited internal and emotional feelings, of which the thalami are the seat. And thus we see that in the cranio-spinal axes the two great nervous circles of sensation and motion are brought into associated action. The corpora striata are the great motor ganglia of the encephalon; and with the vesicular matter of the locus niger, and the anterior segmental ganglia of the spinal cord, they form the motor axis of the nervous system, and the source of all the movements of the body, whether reflex, sensorial, emotional, or voluntary. The corpora striata are not the seat of volition itself, for that is a mental attribute, and seated in the cerebrum; but they are the encephalic motor centres, through which the mandates of the will are propagated—*the connecting links of thought with action*. Their commissural connexions with the cerebrum are so intimate and so extensive, that they are evidently placed in subserviency at every point, through the agency of innumerable radiating commissural fibres, to the volitional power of the hemispheres in every voluntary act and effort. But they are not solely the motor centres of volition. From their close commissural relations with the thalami optici, they are also and equally the centres and channels of respondent sensori-motor actions, and of consensual, instinctive, and emotional movements.

Lying within the bend of the corpora striata are the great centres of sensation, the thalami optici, and, like the former, in most intimate and extensive relation with the cerebrum, through the instrumentality of innumerable fan-like commissural fibres—Reil's nerves of the internal senses—*the connecting links of thought with feeling*. I am aware that Dr. Noble is "disposed to think that the vesicular nuclei within the lateral lobes of the cerebellum, the corpora dentata, constitute the encephalic centres of common sensation;"† but, while I cannot accede to this opinion, I have adduced pathological evidence in support of

* Physiological Anatomy of Man.
† Dr. Noble's "Elements of Psychological Medicine".

Dr. Carpenter's position, that the corpora dentata are the seat of the muscular sense.*

In the great circle of sensational consciousness and instinctive action, we have seen what an important part the thalami optici sustain, as a common centre and point of union to the nerves of special sense. In the higher circle of emotional consciousness, with the corpora quadrigemina, they have an equally important office as the seat of inner feelings and sensibilities associated with the emotional states. But they rise still higher in importance in the psychical scale, from their intimate relations with the cerebrum, through Reil's nerves of the internal senses; for along these channels the sensory impressions are transmitted upwards from the thalami to the perceptive organs, for ideation and registration; and from the centre of intellectual action, ideas, thoughts, and the workings of ideo-dynamical, emotional, and moral agencies, pass downwards to them, there to receive their varying hues and shades of feeling; for, as Dr. Carpenter has well observed, thought bears to feeling, the cerebrum to the thalami, the same relation which the physical impressions upon the organs of the external senses bear to the special endowments of their sensory ganglia in the encephalon; for instance, as in the sense of vision, the retina of the eye to the corpora quadrigemina.

The nervous force is a polar force; and the sensory ganglia, placed midway between the poles, may be played upon from either end; from below or from above; upwards from the outer world, by the appropriate physical stimulus upon the nervous vesicular expansion of each of the external organs of the senses; downwards from the cerebrum, from the inner or psychical world, by the flow of the thoughts, and the workings of ideo-dynamical, emotional, and moral agencies in the cerebral organs. And thus it is that we find idealised impressions reflected downwards from the cerebrum upon the sensory apparatus or ganglia, produce precisely the same effects at the extremities as that which is occasioned by physical impulses there; the mere idea, the recollection of the idealised impression of a pleasant taste, making the mouth to water; and the idea of something disgusting producing sickness and exciting vomiting.†

But the sensory impressions of the special senses, whether sights, sounds, tastes, smells, or feelings, in order that they may be remembered, require to be idealised and registered in the cerebrum; that is, transmitted to the perceptive organs, where ideation is effected; and, as the thalami optici, in the sensory apparatus of the sensational consciousness, are a common foci and point of union to the nerves of special sense, I cannot withhold the expression of my conviction that the central and internal organs of the perceptive consciousness, where the ideation of external impressions takes place, are the great internal convolutions—the well known *ourlet* of Foville. I think it may be fairly inferred, both from human embryology and comparative anatomy, that these great internal convolutions are the primitive and basement convolutions of the cerebral hemispheres. The thin laminæ or crusts which cover the corpora striata in the brain of the fish are manifestly the homologues of these convolutions; and since it is in the fish that we have the first clear and distinct evidence of the exercise of perception, memory, and volitional power, as opposed to mere consensual actions, may we not legitimately conclude that these great internal convolutions are the portals to intellectual action, where the sensible impressions of the external senses become perceived and remembered, and where the will first exerts its power: in other words, that they are the organs of the perceptive consciousness, for outward existence, of ideation, and its associates, memory and volition. Of all the convolutions of the brain, they are the most symmetrical; they are the most constant and regular, and each exhibits with its fellow on the opposite side the most exact symmetry. Their connexions are multitudinous, and commensurate with their importance. Besides their relations with the sensory ganglia of special sensation, first and anteriorly they are in intimate connexion with those superorbital convolutions of the anterior lobes to which pathological investigations point as the organs through which we acquire a knowledge of the physical adjuncts of external existences, such as their size, shape, colour, number, weight or resistance, etc.: secondly and laterally, they are connected with those primitive and early developed basilar convolutions surrounding the fissura Sylvii, and which, from their connexion with the earliest of the animal senses, that of smell, appear to administer to the universal instinct of self-prescrvation: thirdly and posteriorly, they are in intimate union with those backwardly developed convolutions of the posterior lobes which belong more exclusively to the family of man: fourthly and superiorly, they are connected, through an order of anastomosing convolutions, with those great marginal convolutions which constitute the outer and most exalted boundaries of the hemispheres, and with those which take a longitudinal but tortuous course on the upper and outer surface of the brain; and thus connecting as it were perception, the first step above sensation, with the loftier regions of thought. It was here, I believe, that Gall located his organs of *individuality;* but as these convolutions are manifestly the portals to intellectual action, and as perception is but one step, and the first, above sensation, I think we are fully warranted in taking a more comprehensive view of their office, and in considering them as the organs of the perceptive consciousness of external realities, where the sensible impressions from outward existences become idealised and registered. Perception is the first step in intellectual action, and memory and volition are its mental associates. With ideation there is memory, and the presence of volitional power. In the perception proper of outward existences, man stands on the same platform as the lower animals; for the process is equally and alike intuitive in both. From the primeval harmony which obtains between the perceptive consciousness and the outward world, the cognisance of external existences is as strictly an intuitive process as that of sensation itself. When we look at an external object, we can no more avoid the perception that it is a something distinct and apart from ourselves, and of having forced upon our minds intuitive ideas as to its size, shape, colour, etc., than we can reject the sensations of touch, as to its hardness or softness; or those of taste, as to its sweetness or bitterness; or of smell, as to its fragrance or offensiveness: in each and all, the process is alike intuitive.

The brute animal, by virtue of its perceptive consciousness, has manifestly an intuitive sense of space, time, form, and distance. The dog knows his master, and remembers scenes and actions in which they have been associated together. He may be said to have well nigh all the rudiments of our perceptive knowledge, but he holds them in an *instinctive form.* He recognises his master by certain characteristics; but disguise them, and you baulk his instinct. He is deficient in *reflective apprehension;* and it has been aptly said, "though he knows the person, *he does not know how* he knows."

"In man, however," as Mr. Morrell has justly said, "a far more finely attuned organisation is present, and one which is sympathetic with still higher influences. To him nature is not only a system of shapes, shades, and resistances; it speaks a higher language, embodies loftier ideas,

* Vide Case of Tubercles in the Brain.

† It is to be regretted that perversions of the emotional feelings should have met with so little attention in pathological researches. Within the last few days, an interesting *post mortem* examination came under my observation. It was the case of a little girl, aged 8 years, who died on the eighth day of the attack, from effusion at the base of the brain, with softening of the pons Varolii. The manner of her death was very characteristic of the local lesion; but the point of present interest was her impulse and emotional character while living. It was the theme of remark, and a matter of common observation, to all who knew her. I have never met with a more impulsive, excitable, curious, old-fashioned, and shrewd little girl, in the course of my life. I have watched her progress from infancy. She had a large head, and fully developed convolutions; but the size of the thalami optici was such as to rivet my attention, from their unusual magnitude and healthy appearance. I hope others will bear the comparative development of the thalami in remembrance in all cases where the impulse to emotional excitement has been characteristically great. Attention to this point is important, since it is only from multiplied observations that a safe and sound induction can be made.

and breathes into the soul diviner sentiments. The lower animals possess everything included in the organic element of sensation as perfectly as man does. But the difference in the case of perception lies here—that while the brute perceives objects, and acts in reference to them only instinctively, either for the satisfaction of its appetites or for self-preservation, a constant separation is instantly effected by the human faculty between the subject and the object. In this separation lies the first distinctive act of human intelligence,—an act to which there soon succeeds an apprehension of the qualities of the external object totally different from any intelligence that can take place in the case of the lower animals. In the separation of subject and object all thought is primarily cradled; and where that distinction takes place, everything else peculiar to the human intellect is able to follow. No one can say at what exact moment the eye of the child ceases to convey a mere nervous impulse, like that of an animal, and when it awakens on the soul the first glimpse of the sublime and beautiful. The germs of all æsthetic impressions are from the first partially involved in the interior nature of the soul, *i. e.*, in its harmony with the world of beauty without; and they manifest themselves first of all as a spontaneous feeling or instinct, which was from the earliest dawn of reason awakened by the presentation of the phenomena which correspond objectively with it in the universe. Man is at first a mere creature of sensation and instinct; from that he rises to the power of perception, separating the world from himself and becoming conscious, here of his own identity, there of the universe around him. After this he attains to the power of representation and expression, stamps upon objects their distinctive names, classifies and generalises them, and penetrates them with the light of the understanding. After this process of analysis begins the still higher process of synthesis. The objects separated and classified are now reconstructed in scientific order, and the truths which were first seen only by the light of sense and intuition, are now comprehended by the clear light of reason. With the development of the reason are given the conditions for the development of the will, which rises through like gradations from mere instinct to conscious self-esteem, and at last to height of perfect freedom." (Morrell's *Psychology*.)

It is admitted that there is no point in physiology more clearly made out than that the cerebrum, or great hemispherical ganglia, is the seat of intellectual action and volitional power; and the important enunciation of Gall, that the convolutions are the seat of the mental faculties, now meets with general acceptation. "Anatomy," says Dr. Todd, "points to the conclusion that the office of the convolutions is connected with the functions of the mind; and it seems not improbable that the phrenological view which assigns to certain convolutions a special office connected with some particular faculty or faculties is true. This is strongly supported by the fact of a regular disposition of certain primary convolutions, and that in tracing the convolutions from the most simple to the most complex, indications are found of the persistence of the primary and fundamental convolutions in the midst of many that are secondary and superadded ones." (*Cyclopædia of Anatomy and Physiology*.)

A classification of the convolutions, began by Professor Owen, has been greatly extended by Leuret; and it is much to be regretted that he did not live to complete his elaborate and valuable researches. The subject is undoubtedly one of vast interest and great importance, for it is an indisputable fact that the complexity of these convolutions is an index to the place which the animal holds in the scale of intelligence. "Observation," says Leuret, "has shown, what strict induction had led us to conclude, that each group of brains among animals has a type proper to it, and that this type is characteristically manifested by the form of its convolutions." Every family has a brain formed in a determinate manner, and the number, form, arrangements, and relation of the convolutions are found to be in strict accordance with the intelligence displayed. He justly makes a distinction between those convolutions which are primary and fundamental, and to be found throughout the whole series of convoluted brains, occupying the same position, and differing only in their size and extent, and those secondary convolutions which are not constant even in brains of the same group of animals, but are dependant upon the extent of the primary ones, and the connexions which they form with others that are near them.*

To all who are interested in the progress of psychological science, and who have the means of pathological investigation, I would recommend the writings of Gall, and, at the same time, urge upon them the duty of allowing no opportunity to escape them of bringing his dogmata to the test of experience.

So far as outward and visible signs are concerned, he has from multiplied observations established certain cranial handmarks of practical value. Craniscopic observations have led to the general belief, so far as this kind of evidence can produce conviction, that the anterior portions of the cerebrum are subservient to perceptive and intellectual operations; that the coronal and ascending regions are associated with our higher sentiments and loftier thoughts; and that the lateral basilar and lower posterior administer to the animal propensities and lower affections of the mind.

But to determine the functions of the primitive convolutions is the great problem of physiological psychology. It remains unsolved. Nor is this surprising when we consider the conditions of the problem. We are required carefully to note the first appearance and progressive development of the primitive and fundamental convolutions from below upwards in the ascending series of animals, and to endeavour to analyse with certainty the characters of different animals in relation to the objects of their intellectual faculties in accordance with the cerebral convolutions as contrasted with mere consensual actions. Like things are to be compared with like, convolution with convolution, and the same groups in different animals with each other, before the problem can be solved.

All honour is due to Gall, for he was the first to enunciate clearly the true relations between the psychological nature of man and that of the lower animals; and while we claim for Unzer and Prochaska the defining of the boundaries of the sensorium commune, we must look upon Gall as the founder of physiological psychology. One of the most remarkable men of the age in which he lived, he was alike distinguished for originality and independence of thought, for his powers of observation, untiring industry, and indomitable perseverance. To him and his able coadjutor, Spurzheim, medical science, as well as physiology and psychology, is under great obligations. And it is no detrac-

* The labours of Gall and Spurzheim in this interesting field of inquiry were great and manifold; and I would here take the opportunity of paying a passing tribute of respect to the memory of Mr. H. H. Holm, the friend and pupil of Spurzheim, who studied comparative cerebral anatomy with great enthusiasm. He was a fellow of the Zoological Society; and, residing near the society's menageries, he had easy access to the collection, of which he availed himself, to study the habits and dispositions of the animals; and, having permission to examine the crania and brains of those which died, his anatomical and physiological researches were rightly carried on.

Professor Owen, in his valuable paper, "On the Anatomy of the Chetah" (*Felis Jubata*), communicated to the Zoological Society on Sept. 10th, 1833, and published in the first volume of the Society's Transactions, gives a note from Mr. Holm, containing his opinions of the *functions* of the different convolutions in the brain of the chetah, on a comparison of it with the human brain and that of some other animals. After an elaborate description of the brain of the chetah, Professor Owen says:—"Of the constancy of the disposition of the convolutions represented by Gall and Spurzheim as characteristic of the brain of the feline genus, I was first assured by our fellow-member, H. H. Holm, Esq., Lecturer on Phrenology, whose attention has long been directed to this part of anatomy." Mr. Holm was a member of the Royal College of Surgeons, but enjoying an independency, he devoted himself to the pursuit of phrenology, instead of entering upon medical practice. His lectures were amply illustrated by casts, crania, and brains. He pointed out the cerebral convolutions which constitute the several organs, described the modifications which the convolutions receive, and compared them together, to illustrate their magnitudes, positions, junctions, and inter-connexions, with great ability; and so highly did Dr. Spurzheim estimate his talents, knowledge, and zeal, that he made him the special depository of his latest views on the configuration of the cerebral organs in man and the mammalia. Unfortunately, like Leuret, he was cut off in the midst of his labours, and in the fortieth year of his age. (*Vide* a Biographical Notice of Mr. Holm, in vol. xix of Phrenological Journal.)

tion from their merits to reconsider, if not to remodel, the system of organology which they propounded by the light which subsequent physiological inquiry and discovery have thrown upon the subject. In the prosecution of such inquiries, the inductive philosophy of Bacon must be our guide. For while it is never to be forgotten that a refined analysis discovered the harmony of the celestial motions, and conducted the immortal Newton through a maze of intricate phenomena to the great laws appointed for the government of the universe, it is melancholy to reflect for how many ages the opinions of one man were the measure of truth and reason, and, under the sovereignty of the sway of the Stagirite, how universal was the degradation of the human understanding.

But still it is gratifying after the lapse of ages to behold the father of experimental philosophy, the illustrious Bacon, clearly pointing out the absurdity of pretending to account for the phenomena of nature by syllogistic reasoning on hypothetical principles, and with a boldness becoming a genius of the first order, undertaking to give a new chart of human knowledge. Let us follow its guidance and tread in his footsteps. Already there are many labourers in the field, and much has been accomplished. A second Newton may arise among them to thread the labyrinth of metaphysical subtlety and transcendent philosophy with the logical acumen of a Locke, to collect and bind together the scattered and isolated links of the great chain of physiological discovery, to point out the bearings of the pathological facts of past experience, to interrogate nature herself upon the functional characters "written upon the nervous pulp" of the several ganglia, and to read her own replies in the living experiments which she has presented to us in the lower forms of animal existence, and thus to place the great doctrines of mind on the solid basis of a sound physiological psychology!

31, Norfolk Street, Strand, August 1st, 1855.

CASE OF FATAL POISONING BY GERMAN SAUSAGE.

By W. H. MICHAEL, Esq.

[*Read before the Monmouthshire and South Wales Branch, June 28th*, 1855.]

ON March 22nd, 1855, I was desired to see a child living in Postern Lane, Swansea. Upon arriving at the house, I found a fine little boy, between 4 and 5 years of age, lying on his grandmother's lap. There were five other children. The father was a tailor, and the family was in great destitution. The mother had been given the evening previously a German sausage, of which the eldest son had partaken at once. This had made him ill through the night; vomiting and purging had taken place to a considerable extent. The little boy now ill had eaten some of the sausage (according to the statement of the mother, only one or two very thin slices) for breakfast, about two or three hours before I arrived, at 2 P.M. Shortly afterwards he had vomited. About half an hour before I saw him, convulsions had come on, which had alarmed his parents; he had also been violently purged. When I saw him, the general surface was cold; the limbs rigid; the teeth very firmly clenched; the pupils largely dilated, and insensible to stimulus; and he had occasional convulsive spasm of the lips. The lips were livid; the face was deadly pale; no pulse could be felt at the wrist; and the respirations were only three in the minute. He died in about ten or fifteen minutes, and about three hours after eating the sausage, as nearly as could be learnt from the confused statements of the mother.

The remaining portion of the sausage, which was one of the German smoked and dried kind, showed some incipient softening and decomposition (not putrefactive) at the surface; the interior both looked and smelt good. Careful analysis detected no traces of metallic poison. The mouldiness frequently spoken of by authors could not be seen.

The *post mortem* examination showed the stomach half full of pieces of sausage, floating in a pulpy mass, half digested, of the same. Considerable irritation and mammillation of the mucous coat existed, especially towards the pyloric orifice. The mucous coat of the small intestines was irritated throughout, small puncta of blood being observable over the surface, which was bathed in increased mucous secretion. The brain was congested, as were also the thoracic organs. The other portions of the body (which, although well formed, was much attenuated) were healthy.

I have taken the liberty of bringing this case before your notice, because, so far as I can learn, it is the first that is known to have occurred in England, although in Germany such cases are fearfully prevalent. In Wurtemburg alone, according to official returns, more than four hundred cases have occurred in the past fifty years, of which a hundred and fifty died. Of these, forty per cent. occurred in the month of April; and this has been put down as a matter of some importance in determining the character of the poison, which is said usually to manifest its symptoms in from twenty-four to forty-eight hours after ingestion; this, according to Christison, being due to the great difficulty with which the fat supposed to contain the poison is assimilated. Recent researches appear to have proved, contrary to what has long been supposed, and which rests mainly on prejudice, that unprepared meats, far advanced in the putrefactive process, or belonging to diseased animals, may be eaten with impunity. Information regarding this subject may be found in *Traité des Substances Alimentaires*, by M. Payer; also in researches at the Veterinary School at Alfort, by Messrs. Huzard, Renauld, and others; and in a narrative of M. Flourens, who relates that, in 1789, the poor of St. Germains ate, without inconvenience, 700 or 800 horses, which had died from farcy and glanders. Becquerel also mentions the same in his *Manuel d'Hygiene*, of animals which died of contagious typhus in 1814, 1815, and 1816. It is evident, from all the facts recorded, that prepared and smoked meats, especially when eaten raw, also salted fish, cheese, musty fats, ham, etc., may become poison. Many cases have occurred where meat cooked has produced no ill effects, where the same raw has caused fatal poisoning. The works of Orfila, Christison, Chevalier, and Duchesne, also contain many examples. Christison, however, states, in opposition to what I have before remarked, that animals who have died of disease can cause poisoning; but this was in 1844, before the experiments at Alfort and elsewhere.

These poisonous symptoms have been attributed to metallic poisons; this is evidently disproved by Emmert (*Inaugural Dissertation*, Tubingen: 1815): to the presence of hydrocyanic acid; but no investigator has succeeded in showing the presence of the cyanides; and the author of the hypothesis has himself abandoned it. Berres, Rumpelt, and Saladin, have attributed it to oxy-acetic acid; but this would quite fail, for the same poisons are developed in cheese and uncooked meats. Witting considers the result due to some empyreumatic acid; and Kastner, in his *Handbuch der angewandten Naturlehre*, to the acrolein produced by smoking. Kerner, who has written well on the subject, attributes it to nitro-phenylic acid; but this has been since discovered not to be poisonous; Weiss and Liebig, to an animal poison, such as typhoid miasm. The symptoms of putrid poisoning are, however, manifestly wanting, and have no analogy with an animal ferment; and it is notorious that gastric juice may determine and so alter the character of putrid animal matter as to make it innocuous. See the experiments of Dr. Bernard on the subject. Buchner, in his *Toxicologie*, says he has extracted a fatty poisonous acid; as also Schumann, in Horn's *Archives*. This, when dissolved in alcohol, and administered to a dog, caused death in thirteen days. Professor Schlossberger ascribes it to a basoid alkaloid; but this never appears to have been separated and examined, and moreover is contradicted by the fact that poisonous sausages have ever been observed to have an acid reaction. I have ventured