difference between these movements and those which it performed before the division of the cord, except that it now walked with less power and energy. I allowed the animal to remain at rest for a short time, and then slightly touched with the point of a needle the integuments of the right dorsal region, and it raised up its right hind foot and passed its toes across the part. On irritating the integuments of the left side of the abdomen, it raised up its left hind foot again and again to the part. After a short interval, I touched with the point of a needle the upper portion of the left dorsal region immediately below the division of the cord, and it raised up its left hind foot and passed its toes distinctly over the part. I continued the irritation, and the animal repeated the movement, raising up its left hind foot and passed its toes over the part.

"We are, I think, justified in concluding:

"1st. That of the mental faculties, perception and volition are seated in the spinal cord, as well as in the cerebral ganglia.

"2nd. That the cord is not probably capable of *originating* mental influence independently of sensorial impressions—a condition of the brain also, till it has accumulated facts through the operation of the senses.

"3rd. That as memory is not an attribute of the mental influence evolved by the spinal cord, it requires, unlike the brain, a new impression, in order that mental force may be produced."

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2. *French Retrospect.*

(Concluded from Vol. xxi, *p.* 632.)

M. Léon Dumont on Cerebral Reflex Action.*

In this valuable paper M. L. Dumont gives a critical history of cerebral reflex action, and of unconscious cerebration. Having given a short summary of the first definitions of reflex action, and taking the views of Prochaska and Legallois as a starting-point of his history (Unzer was, however, the teacher of Prochaska, and the most philosophical inquirer of the last century), he brings the subject to the time when Marshall Hall, founding on the experiments of Flourens, maintained that the brain is not an excito-motor organ, and cannot, therefore, be the seat of any reflex action.

It was at this date (1837) that Laycock, in examining the phenomena of mesmerism, showed that both the mental and the motor phenomena caused by mesmeric processes are simply due to pathological conditions of the brain, thus artificially induced, and to be classed with those of imitation, delirium, hallucination, somnambulism, &c.,

* L'Action Reflexe Cerebrale. MM. Laycock, Carpenter, Luys. *La Revue Scientifique.* Jan. 8th, 1876.

https://doi.org/10.1192/bjp.22.97.151 Published online by Cambridge University Press

and that all these and other phenomena are dependent on a reflex function of the brain. Laycock further demonstrated, in investigating hysterical phenomena, the influence of the ovaria in exciting *automatic* activity of the brain in women, who are the chief subjects of mesmeric as well as of hysterical disorders.

M. Dumont then gives a summary and criticism of Laycock's chief researches, ending with his chapter on Memory, in the last volume of this Journal (July, 1875); fully asserting his priority as to reflex cerebration.

M. Dumont next takes up Carpenter's researches, which date from 1852, as then published in his "Outlines," and more recently in his "Mental Physiology," and examines critically and at length the opinions which specially belong to Carpenter. He refers to his previous essay in the "Revue Scientifique,"* as showing that the facts Carpenter quotes from Sir William Hamilton afford no support whatever to his doctrines of "Unconscious Cerebration." And as to other mental phenomena brought forward by Carpenter, M. Dumont is equally doubtful. Of this class are the recall into consciousness when we least expect it of an idea we have vainly sought to bring back, and the other like instances, such as the elaboration of judgments and the invention of ideas. They are rather conjectures, to be explained by a theory of unconscious cerebration, than proofs of the doctrine. M. Dumont here introduces some interesting views of his own, which we shall shortly notice.

Under a third head, M. Dumont notices the adoption of the doctrine of cerebral reflex action by English and French psychologists of the experimental school, and observes, that if contemporary English philosophers, like Darwin, Spencer, and Bain (he might have also named Huxley), do not expressly extend the doctrine of reflex action to the brain, it is only a question of terminology; while they speak of spinal reflex action only, they do not fail to explain cerebral functions as being reflex.

M. Dumont thinks that the notion of extending the theory of reflex action to cerebral phenomena, which has of late been largely developed in France, is probably due to the influence of English physiologists and psychologists. He specially names M. Taine, as having applied the doctrines to psychology, in his valuable work on the Intellect, and M. Onimus as having applied it to the elucidation of the physiology of language, and of the morbid states known as aphasia.†

M. Dumont devotes a fourth division of his history to the recent treatise of M. Luys, observing that the labours of neither Laycock nor Carpenter have any mention, as they ought to have had, in that work.‡ So far as the general phenomena and doctrines are involved,

* "Conscience et Inconscience," Rev. Scient., 28 Dec., 1872.

† "Sur le Language considéré comme phènomène automatique." Journ. de l'Anat. et de la Physiol, 1873, p. 543.

‡ Etudes de Physiologie et de Pathologie Cerebrales.—Des actions reflexes du cerveau dans les conditions normales et morbides de leur manifestations, 1874.

https://doi.org/10.1192/bjp.22.97.151 Published online by Cambridge University Press

M. Luys adds little to the views Laycock has taught and applied to physiology, pathology, and practice. More especially Luys adopts Laycock's theory that the hemispheres are in relation as "trophic" centres with the whole body, and have much more, therefore, than the restricted functions assigned to them by physiologists of ministering to external relations and mental activity in the influence they exercise over all *internal* relations. Concurrently with this view, Luys adopts also Laycock's doctrine of the diffusion of impressions through the brain and nerve-centres, and thence through the body; but he fits to all these an anatomical theory of a "sensorium commune" whence the "irradiation of incitations takes place to all parts." This he places in certain submeningeal zones of small cells to be found in the cortical substance of the convolutions. It is in this region that the operations of the will, as due to cerebral reflex function, take place. M. Dumont, in criticising Carpenter's "suprasensible" hypothesis of the will, remarks that volition is, in truth, according to Carpenter's own ideo-motor theory, a striking manifestation of reflex action, in accord with ideas which are themselves due to excitation from without, and transformed in the depths of the cortical zones into corresponding ideations,

M. Dumont, in objecting to Carpenter's anatomical theory of a sensorium commune, also observes that it is more reasonable to conclude that the seat of the consciousness of a given moment is that part of the brain or of the nervous system where the change takes place, upon which the consciousness of the moment depends. It is probable (he thinks) that with each act of attention or of will towards a determinate object, there is a local cerebral hyperæmia, within the limits of which consciousness becomes more vivid, to the detriment of consciousness in all other parts of the brain, which, at the same time, also become proportionally anæmic. The play of the organ is super-excited by a certain amount of motion received from without, and hyperæmia is the natural result of the acceleration of nutrition thus induced. This hypothesis is not without solid support in other phenomena. Thus, it has long been well known that the cutting off of the supply of blood to a particular portion of the brain by plugging of the vessels, or otherwise, is followed by defective nutrient and functional activity of the portion of brain-tissue so supplied. Hughlings Jackson, in this country, has largely illustrated this class of morbid phenomena, and more recently M. Duret has given a very valuable exposition of the distribution of the encephalic arteries, with special reference to this point.*

These views have, however, rather a mechanical than a dynamical bearing. It is desirable to know how, in attention, volition, thought, emotion and the like mental conditions, the activity of the circulation and of the nutrient processes is influenced in particular cerebral regions. To explain these phenomena, Laycock adopts the theory of cerebral

* "Archiv. de Physiolog.," Dec., 1874.

https://doi.org/10.1192/bjp.22.97.151 Published online by Cambridge University Press

vasomotor and trophic reflex action. Accordingly the various encephalic centres, which are vasomotor centres, have respectively their corresponding cerebral areas or regions of arterial distribution and trophic activity. This is seen, *e.g.*, in the relation of the pons to the parts supplied from the vertebrals and basilar artery, and of the areas of the internal carotid—the hemispheres. Thus, there is an anatomical relation between the development of the cerebral nerve-centres and the trophic areas on the one hand, and between these latter and the source of excitation, whether they be external, or internal on the other. Laycock has applied these views to both physiology and pathology.*

This is but a brief notice of M. Dumont's important critical history. Other interesting views as to consciousness are stated by M. Dumont himself, but there are difficulties in the way of clearly comprehending them, more especially as to the relations of consciousness to organization, which are due, apparently, to ambiguities in the use of the term. It would be of essential service to future inquiries and discussions, if an exact physiological meaning of this and other terms could be agreed on. It might be settled, for example, whether the word "consciousness" should be used strictly to denote a cause or a condition, and, that being determined, to take another word to denote the cause, if consciousness be held to be a state or condition, and due to a cause—as, for example, when the state of hotness is said to be due to heat. In this case, mind might be used to denote the energy or cause on which consciousness as a considered condition depends.

Some Observations on Mental Disease. By Dr. Lentz.†

The first of these observations treats of the use of hot water as a revulsive. It is well-known that congestion, especially in its more rapid and severe forms, is often frequent in both the cerebro-spinal and respiratory systems of the insane, and often proves rapidly fatal. The general debility of the insane appears to be daily increasing, and their condition to demand rather the infusion than the abstraction of blood.

It is in asylums that these congestive attacks are most frequently seen, often following convulsive attacks of various forms, and producing an embarrassment of respiration which must soon lead to a fatal result, unless assistance be afforded. Bleeding, in all its forms, must be discarded, its employment only tending to hasten death,

† See "Mind and Brain," 2nd edit., 1869, Vol. ii, p. 471, *et seq.*, where ganglionic and segmental areas of nutrition in the brain and spinal cord are defined. See also for practical applications to clinical observation, "A Clinical Trophic and Vasomotor Anatomy of the Brain and Spinal Cord, from a new point of view," "Med. Times and Gazette," 19 Aug. and 2nd Sept., 1871.

† Bulletin de la Société de Medecine Mentale de Belgique, 1873.

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especially after the convulsions of general paralysis. In these cases treatment must be prompt and decisive, and these indications appear to be responded to by the use of hot water as a revulsive in the following manner. A large sheet, folded in four, is to be soaked in hot water, and to be immediately applied to the whole anterior and posterior surfaces of the trunk alternately; in some cases to both at once, as well as to the soles of the feet and the calves of the legs. The applications may be renewed every minute, the temperature of the water varying with the gravity of the case, and even boiling water may be used. These applications are of special value when applied to the whole extent of the spine. This procedure is not new, and though of no avail in the cure of paralysis or epilepsy, has saved life, and possesses the advantage of easy and rapid application. It acts rapidly on sensibility, and, applied to the spine, it restores patients from the prolonged stupidity which follows epilepsy. The result in these cases is as much attributable to the action on sensibility as to that on the vascular system. Further, this treatment is perfectly harmless; the most serious result being a slight scald, which, however, is rarely seen, the action of the hot water being less severe when applied by means of linen than when directly applied.

The second observation is on a case of pachymeningitis, in a young man of 21, the result of a fall on the head. On admission the patient, while exhibiting the symptoms of acute delirious mania, was emaciated and pale, showing that bleeding had been freely resorted to. He was incoherent and restless; possessed varying delusions; slept little; and was very dirty in his habits. Nothing striking was observed in the state of the motor functions, or in the sensibility. The history was imperfect, but some months previously a piece of coal had fallen on his head while in the pit. The disease had begun by an access of fever, returning each afternoon, and characterised by redness of the face, injection of the eyes, pain in the head, an expression of stupor, and, finally, a restlessness increasing until evening. In the morning he would be better, but after admission this intermittence disappeared.

After four months he was discharged convalescent, but in five months was readmitted. On this occasion he was in a state of absolute dementia, silent, dirty, and requiring his food to be placed in his mouth. Sensibility remained, but was obtuse. He remained in this condition for three months, after which he began to brighten, talking incoherently, and taking notice of what was going on about him. An attack of excitement seemed to be imminent, when suddenly in October he sustained an attack of epileptiform convulsions, which left him in a condition very similar to that in which he was when readmitted. This attack was soon followed by others, his condition varying from stupor to restless excitement, and in one of greater severity than usual he died.

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On post-mortem examination the calvarium was found normal; the dura mater much injected, especially on the right side, which exhibited complete fluctuation; the left side was normally resistent. The opening of the arachnoid cavity displayed a true sac, occupying the whole extent of the right half of that cavity. The sac, completely closed, was perfectly organized, and composed of a soft, velvety membrane, with a smooth and glossy surface, free where opposed to the brain, but slightly attached where opposed to the dura mater. It contained a considerable quantity of blood, which had collected at the base of the brain, especially in the infra-spinous fossa. Save a slight injection, the brain and its membranes were healthy, though in the right hemisphere there existed a well-marked depression, corresponding to the collection of blood in the infra-spinous fossa. The other organs presented nothing unusual.

This condition, viewed in connection with the progress of the case and the nature of its symptoms, appears to support the theory last maintained by Virchow, on the formation of neo-membranes of the dura mater. Whilst Baillarger admitted that the cyst was formed from the effused blood itself, others held that that only acted as an irritant on the arachnoid, provoking an exudation, which, becoming organised, formed the cyst, in both theories the hæmorrhage being looked upon as primary.

Virchow holds that the cyst is a result of inflammation of the dura mater, and that the blood is afterwards effused into it.

In this case, the first symptoms were suggestive of the irritation of inflammation; as the membrane became organized these gradually disappeared, then hæmorrhage taking place, the appearances of dementia were produced, these again in their turn to fade away as the clot became absorbed.

Another point of interest in this case is the fact of the occurrence of traumatic pachymeningitis in a patient lacking a well-marked predisposition.

As regards diagnosis, this case appears to be one of well-defined symptomatic mania, the disease being pachymeningitis, the mania only a symptom. In two cases, with similar delusions, one may be diagnosed as symptomatic; the other as due to organic disease, by the absence from, or presence in, at their outset, of those evidences of loss of intellectual power, often seen in old standing cases, or early in the course of general paralysis.

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